United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
South Dakota Agricultural
Experiment Station

Soil Survey of Jerauld County, South Dakota

How To Use This Soil Survey

General Soil Map

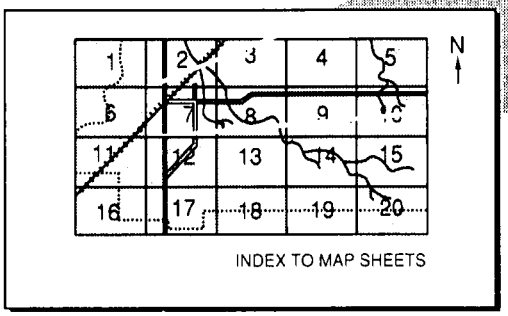
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

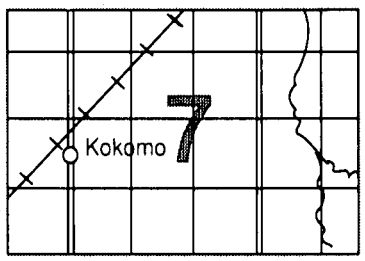
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

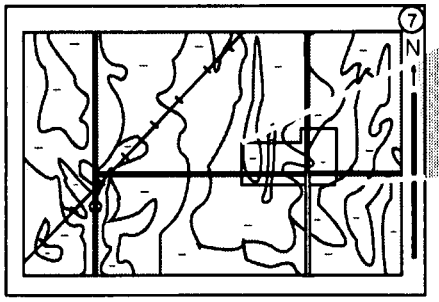


INDEX TO MAP SHEETS



MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



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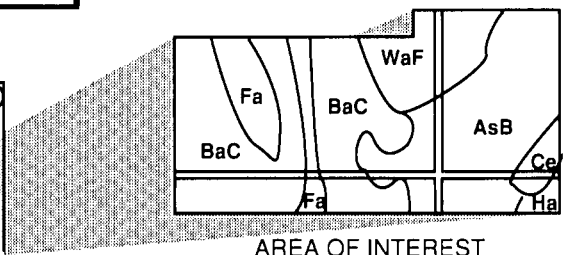

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1986. Soil names and descriptions were approved in 1987. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1987. This survey was made cooperatively by the Soil Conservation Service and the South Dakota Agricultural Experiment Station. It is part of the technical assistance furnished to the Jerauld County Conservation District. Some financial assistance was provided by the South Dakota Department of Revenue and the Jerauld County Commissioners.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: An area of Lane silty clay loam in the foreground. An area of Betts-Ethan loams, 6 to 40 percent slopes, stony, is in the background on the Wessington Hills.

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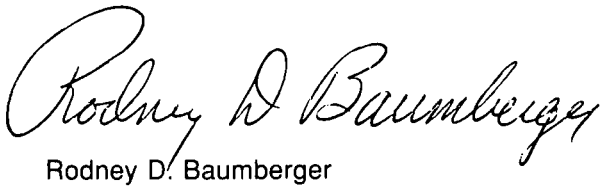
Foreword

This soil survey contains information that can be used in land-planning programs in Jerauld County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production while protecting our soil, water, air, plants, and animals. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



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Soil Survey of Jerauld County, South Dakota

By Regis L. Vialle, Soil Conservation Service

Soils surveyed by Regis L. Vialle, Thomas M. Schumacher, Karl J. Krueger, and Imer M. Ward, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
the South Dakota Agricultural Experiment Station

JERAULD COUNTY is in the east-central part of South Dakota (fig. 1). It has a total area of 340,602 acres, or about 532 square miles. This acreage includes about 1,344 acres of water.

General Nature of the County

This section gives general information concerning the county. It describes climate; physiography, relief, and drainage; settlement; farming; and natural resources.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Wessington Springs in the period 1951 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 17 degrees F and the average daily minimum temperature is 9 degrees. The lowest temperature on record, which occurred at Wessington Springs on January 15, 1972, is -28 degrees. In summer, the average temperature is 73 degrees and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred at Wessington Springs on July 10, 1966, is 110 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

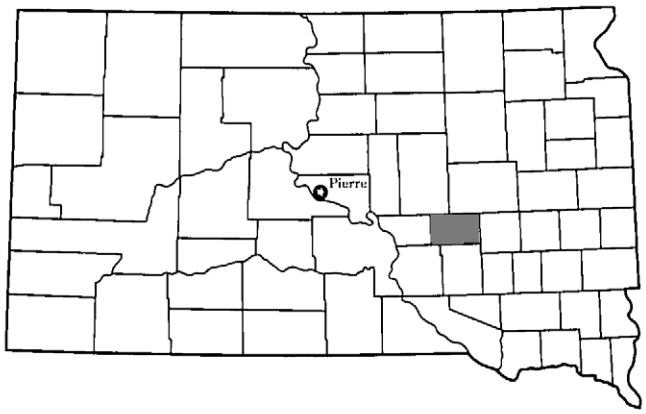

Figure 1.—Location of Jerauld County in South Dakota.

The total annual precipitation is 20.55 inches. Of this, nearly 16 inches, or about 75 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 13 inches. The heaviest 1-day rainfall during the period of record was 3.61 inches at Wessington Springs on July 26, 1968. Thunderstorms occur on about 40 days each year.

The average seasonal snowfall is about 29 inches.

The greatest snow depth at any one time during the period of record was 28 inches. On the average, 44 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 14 miles per hour, in spring.

Physiography, Relief, and Drainage

Jerauld County is divided into two distinct areas by an end moraine known as the Wessington Hills. These hills extend from north to south in a crescent shape through the center of the county.

The region west of the Wessington Hills is part of the Coteau du Missouri division of the Missouri Plateau *(4)*. This region mainly consists of end moraines and nearly level to moderately sloping and gently rolling ground moraines. Much of the material deposited on the ground moraines is silty. The principal drainageways in the region are Crow Creek and Smith Creek, which both drain southward and westward.

The region east of the Wessington Hills is part of the James River Basin. This region mainly consists of glacial till deposits. It is lower in elevation than the western part of the county, and overall it gently slopes to the east. In this region, the land west of Firesteel Creek is drained by Firesteel Creek and the land east of Firesteel Creek is mostly drained by Sand Creek and Morris Creek.

Elevation ranges from about 1,300 feet above sea level in areas along the eastern edge of the county to a little more than 2,000 feet in parts of the Wessington Hills and in the northwestern part of the county.

Settlement

In 1883, Jerauld County was formed by the territorial legislature from parts of Buffalo and Aurora Counties *(6)*. It was organized in the same year and named in honor of H.A. Jerauld of Canton. In 1857, the first road into South Dakota was built and called "Nobles Trail." It formed a route westward from Fort Ridgley, Minnesota, to the site of Wessington Springs and then southward to Fort Lookout on the Missouri River. The first permanent settler in Jerauld County was Levi Hain, who built a log cabin in 1876 at a site called the Big Springs. Wessington Springs, the county seat, was plotted in 1881. Because of its location at the foot of the Wessington Hills, it is the natural trade and shipping center of the county.

Agriculture has always been the principal enterprise of the county. The early settlers produced wheat almost exclusively. Because of drought in the late 1800's, a diversified agricultural system that included raising livestock became a more important part of the economy.

The population of the county peaked in the 1920's and has been declining since then. In 1950, the population was 4,459. The 1980 census showed a decline to 2,929. Wessington Springs has a population of 1,192. Alpena and Lane are other towns in the county.

One Federal and one State highway run through the county. State Highway 34 runs east and west through the center of the county. Federal Highway 281 runs north and south and crosses State Highway 34 about 3 miles east of Wessington Springs. The county has an excellent system of truck highways and a network of lesser roads. The State owns about 5 miles of railroad track in the northeast corner of the county.

This survey updates the soil survey of Jerauld County published in 1951. It provides additional information and larger scale maps, which show the soils in greater detail.

Farming

Farming is the principal enterprise in Jerauld County. In 1982, the county had 315 farms, which averaged about 959 acres in size *(13)*. The trend is toward fewer and larger farms. About 82 percent of farm income is derived from the sale of livestock and livestock products. The rest is derived from the sale of small grain and corn. Some of the crops are used as feed for livestock.

About 46 percent of the acreage in the county is used for cultivated crops or for tame pasture and hay, and about 51 percent is used as range *(12)*. In 1980, about 2,275 acres was irrigated. Almost all irrigation is by sprinkler systems.

Corn, wheat, oats, and grain sorghum are the main cultivated crops. Alfalfa, intermediate wheatgrass, and smooth bromegrass are the main crops grown for hay. In 1984, corn was planted on about 28,300 acres, wheat on 23,300 acres, oats on 19,000 acres, and sorghum on 8,800 acres *(7)*. About 23,700 acres of corn was harvested for grain. The rest of the corn was used mainly for silage. Much of the sorghum was used for grazing or silage.

The Jerauld County Conservation District was organized in 1943 to help farmers control erosion. It has

been instrumental in planting hundreds of acres of trees.

Natural Resources

Soil is one of the most important natural resources in Jerauld County. It provides a growing medium for crops and for the grasses grazed by livestock. Other natural resources are water, wildlife, and sand and gravel.

Most of the water for irrigation purposes comes from relatively shallow glacial aquifers that underlie portions of the county. These aquifers are composed of water-yielding sand and gravel deposits. Most of the domestic and livestock wells tap bedrock aquifers. These aquifers vary in depth from about 100 feet in the eastern part of the county to 1,300 feet in the northwestern part *(5)*. They are artesian formations; yet water in many of the wells in these aquifers does not naturally flow to the surface and pumps may be needed. Water quality varies but generally is unsuitable for irrigation purposes.

Coyote, cottontail, red fox, white-tailed deer, and wetland and upland game birds, such as waterfowl, gray partridge, sharp-tailed grouse, and ring-necked pheasant, are some of the main wildlife species. Wetlands provide areas for wildlife habitat.

Scattered deposits of sand and gravel are throughout the survey area. Because they include an excessive amount of fine rock fragments, such as shale, chalk, and clay ironstone, the sand and gravel are unsuitable as concrete aggregate or as construction material. They are suitable, however, as subgrade material for roads and as bituminous aggregate.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; and the kinds of crops and native plants growing on the soils. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas up to 4 acres in size and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The 10 associations in this survey area have been grouped for broad interpretive purposes. The associations and the groups are described on the pages that follow. The names of the associations do not fully agree with those on the general soil maps in the published surveys of adjacent counties, including Aurora, Beadle, Brule, Buffalo, Hand, and Sanborn. Differences are the result of variations in the design and composition of map units or changes and refinements in series concepts.

Soil Descriptions

Nearly Level to Moderately Steep, Loamy Soils on Outwash Plains and Moraines

These soils make up about 8 percent of the county. About 60 percent of the acreage is range. Conserving moisture is the main management concern.

1. Delmont-Ree-Canning Association

Somewhat excessively drained and well drained, nearly level to moderately steep, loamy soils on outwash plains and moraines

This association is on summits, shoulder slopes, back slopes, and foot slopes characterized by numerous drainageways. Slopes generally are nearly level to strongly sloping or rolling. They are moderately steep in some areas. In most areas, the drainage pattern is well defined and drainage outlets are good.

This association makes up about 5 percent of the county. It is about 30 percent Delmont and similar soils, 20 percent Ree and similar soils, 15 percent Canning soils, and 35 percent minor soils (fig. 2).

The somewhat excessively drained Delmont soils are on summits, shoulder slopes, and back slopes. Slopes range from 0 to 20 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown loam and grayish brown, calcareous very gravelly sand. The underlying material is light brownish gray, calcareous very gravelly sand.

The well drained Ree soils are on back slopes and the upper foot slopes. Slopes range from 0 to 6 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown and brown clay loam in the upper part and pale brown and light brownish gray, calcareous loam in the lower part. The underlying material is light brownish gray and calcareous. It is sandy clay loam in the upper part and very gravelly sand in the lower part.

The well drained Canning soils are on summits and back slopes. Slopes range from 0 to 6 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is grayish brown, brown, and light brownish gray clay loam. It is calcareous in the lower part. The underlying material is multicolored, calcareous very gravelly sand.

Of minor extent in this association are Betts, Bon, Enet, Ethan, Henkin, and Talmo soils. Betts and Ethan soils formed in glacial till. They are on some of the steeper breaks. Bon soils are on high flood plains. Enet soils are on back slopes and the upper foot slopes. Bon and Enet soils are dark to a depth of more than 20 inches. Henkin soils do not have gravelly material. They are on summits and back slopes. The excessively drained Talmo soils are less than 14 inches deep over gravelly material. They are on shoulder slopes.

About 60 percent of this association supports native grasses and is grazed or used for hay. Some areas are cultivated. A few areas are irrigated. Small grain and

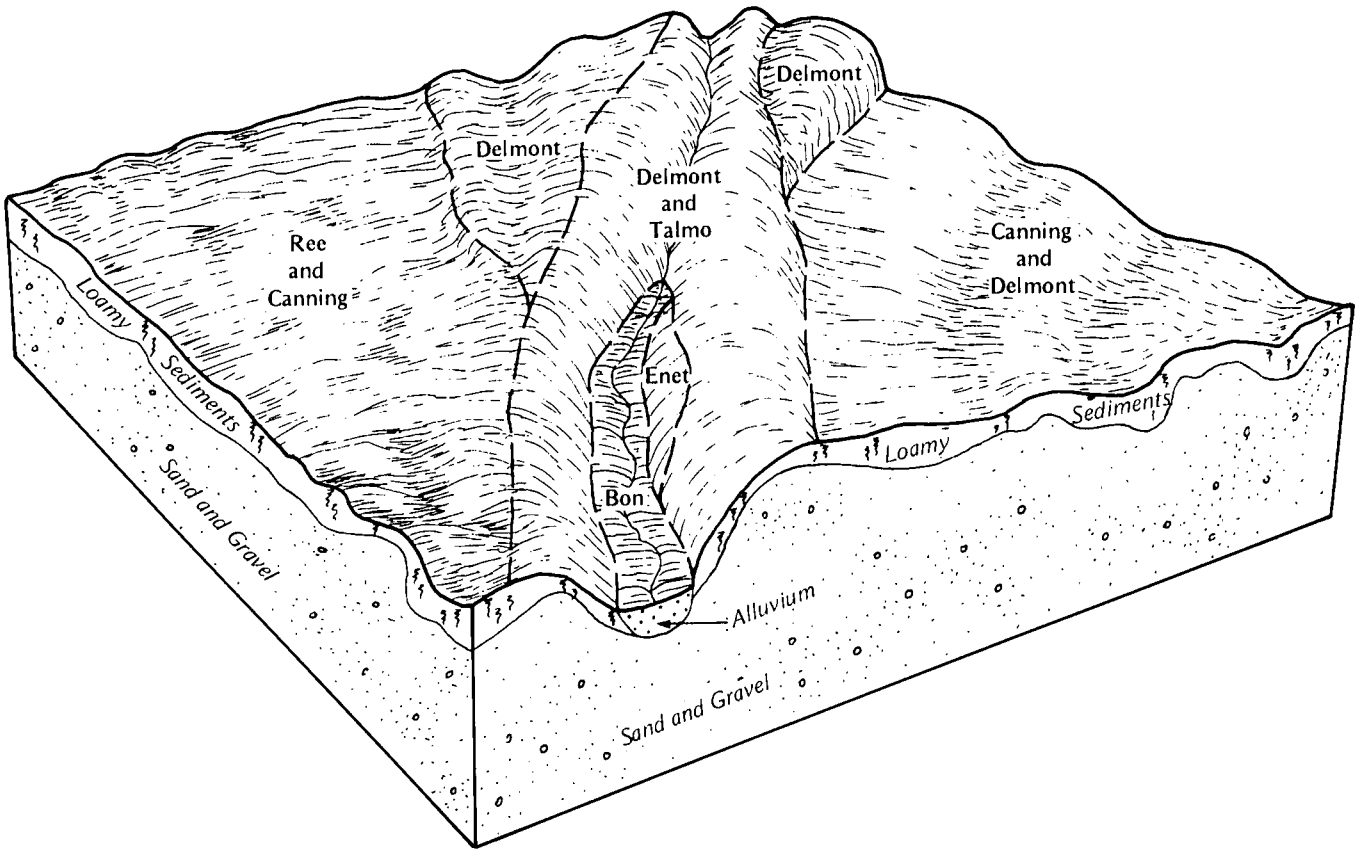

Figure 2.—Pattern of soils and parent material in the Delmont-Ree-Canning association.

sorghum are the main crops. The major soils, except for the steeper Delmont soils, are suited to cultivated crops and to tame pasture and hay. The Delmont and Canning soils are droughty unless irrigated.

2. Enet-Delmont Association

Well drained and somewhat excessively drained, nearly level to moderately steep, loamy soils on outwash plains and moraines

This association is on broad flats. Slopes generally are nearly level to undulating. They are moderately sloping to moderately steep in some areas. Generally, the drainage pattern is somewhat poorly defined and drainage outlets are few. The drainage pattern is well defined in the steeper areas.

This association makes up about 3 percent of the county. It is about 55 percent Enet soils, 20 percent Delmont and similar soils, and 25 percent minor soils.

The well drained Enet soils are on back slopes and the upper foot slopes. Slopes range from 0 to 6 percent. Typically, the surface layer is very dark grayish brown loam. The subsoil is dark grayish brown loam. The underlying material is brown, calcareous, very gravelly loamy sand in the upper part and pale brown, calcareous very gravelly sand in the lower part.

The somewhat excessively drained Delmont soils are on summits, shoulder slopes, and back slopes. Slopes range from 0 to 20 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown loam and grayish brown, calcareous very gravelly sand. The underlying material is light brownish gray, calcareous very gravelly sand.

Of minor extent in this association are Crossplain, Ethan, Fedora, Hand, Lawet, Plankinton, and Tetonka soils. The somewhat poorly drained Crossplain soils are on toe slopes. Ethan and Hand soils are on till plains and do not have gravelly material within a depth of 40 inches. The poorly drained Fedora and Lawet soils are on foot slopes and low flood plains and have a seasonal high water table. The poorly drained Plankinton and Tetonka soils are in basins.

About 55 percent of this association supports native grasses and is grazed or used for hay. Some areas are

cultivated. A few areas are irrigated. Small grain and sorghum are the main crops. Conserving moisture and controlling erosion are the main concerns in managing cultivated areas. The major soils, except for the steeper Delmont soils, are suited to cultivated crops and to tame pasture and hay. They are droughty unless irrigated.

Nearly Level to Moderately Steep, Loamy and Silty Soils on Till Plains and Moraines

These soils dominantly are nearly level to moderately sloping. They are moderately steep near the larger drainageways. The soils make up about 64 percent of the county. About 63 percent of the acreage is cropland. Conserving moisture and controlling erosion are the main management concerns.

3. Ethan-Houdek-Eakin Association

Well drained, nearly level to moderately steep, loamy and silty soils on till plains and moraines

This association is on summits, shoulder slopes, and back slopes. Slopes generally are nearly level to gently rolling. They are moderately steep in some areas near the larger drainageways. The drainage pattern generally is well defined. It is poorly defined in some areas where drainageways terminate in small basins. Scattered stones are on the surface in most areas.

This association makes up about 30 percent of the county. It is about 25 percent Ethan and similar soils, 20 percent Houdek and similar soils, 15 percent Eakin and similar soils, and 40 percent minor soils.

The Ethan soils are on shoulder slopes and back slopes. Slopes range from 2 to 20 percent. Typically, the surface layer is grayish brown, calcareous loam. The subsoil is pale brown and light gray, calcareous loam. The underlying material is light gray, calcareous loam.

The Houdek soils are on summits and back slopes. Slopes range from 0 to 9 percent. Typically, the surface layer is very dark grayish brown loam. The subsoil is clay loam. It is dark grayish brown in the upper part and grayish brown and pale brown and calcareous in the lower part. The underlying material is light brownish gray, calcareous clay loam.

The Eakin soils are on summits and back slopes. Slopes range from 2 to 6 percent. Typically, the surface layer is dark grayish brown silt loam. The subsoil is dark grayish brown and light brownish gray silty clay loam. It is calcareous in the lower part. The underlying material is light brownish gray, calcareous clay loam.

Of minor extent in this association are the well drained and moderately well drained Bon soils; the moderately well drained Dudley, Onita, and Prosper soils; the poorly drained Plankinton and Tetonka soils; and the very poorly drained Worthing soils. Bon soils are on high flood plains. The sodium-affected Dudley soils are on back slopes. Onita and Prosper soils are on foot slopes. Plankinton, Tetonka, and Worthing soils are in basins.

About 50 percent of this association is cropland. Alfalfa, corn, small grain, and sorghum are the main crops. Conserving moisture, controlling erosion, and maintaining fertility are the main concerns in managing cultivated areas. The major soils are suited to cultivated crops and to tame pasture and hay. Much of the acreage supports native grasses.

4. Homme-Peno Association

Well drained, nearly level to moderately steep, loamy and silty soils on till plains and moraines

This association is in areas characterized by numerous basins and swales. The drainage pattern is well defined in most areas. Scattered stones commonly are on the surface.

This association makes up about 10 percent of the county. It is about 45 percent Homme soils, 30 percent Peno soils, and 25 percent minor soils (fig. 3).

The Homme soils are on summits and back slopes. Slopes range from 0 to 9 percent. Typically, the surface layer is dark grayish brown silty clay loam. The subsoil is dark brown, light olive brown, and pale brown silty clay loam. It is calcareous in the lower part. The underlying material is grayish brown, calcareous clay loam.

The Peno soils are on shoulder slopes and the upper back slopes. Slopes range from 2 to 15 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is very dark gray, gray, and light brownish gray clay loam. It is calcareous in the lower part. The underlying material is grayish brown, calcareous clay loam.

Of minor extent in this association are Beadle, Bon, Ethan, Gettys, Lane, Onita, Plankinton, and Worthing soils. Beadle soils are deeper to lime than the Peno soils and generally are on the more nearly level slopes. Bon soils formed in alluvium and are on high flood plains. Ethan soils have less clay than the major soils and are on narrow shoulder slopes. Gettys soils are on the steepest slopes and do not have a dark surface layer that is more than 4 inches thick. Lane and Onita soils are moderately well drained. Lane soils are on the foot slopes of fans. Onita soils are on foot slopes and toe slopes. The poorly drained Plankinton and very poorly drained Worthing soils are in basins.

About 75 percent of this association is cropland. Alfalfa, corn, small grain, and sorghum are the main

crops. Conserving moisture, maintaining fertility and tilth, and controlling erosion are the main concerns in managing cultivated areas. The major soils are suited to cultivated crops, tame pasture and hay, and range.

5. Clarno-Ethan-Prosper Association

Well drained and moderately well drained, nearly level to gently rolling, loamy soils on till plains and moraines

This association is in areas characterized by numerous undulations and numerous small basins. The drainage pattern is somewhat poorly defined in areas where drainageways terminate in small basins.

This association makes up about 16 percent of the county. It is about 30 percent Clarno and similar soils, 20 percent Ethan and similar soils, 15 percent Prosper and similar soils, and 35 percent minor soils (fig. 4).

The well drained Clarno soils are on summits and back slopes. Slopes range from 0 to 9 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is loam. It is brown in the upper part and pale brown and calcareous in the lower part. The underlying material is pale brown, calcareous loam.

The well drained Ethan soils are on shoulder slopes and back slopes. Slopes range from 2 to 9 percent. Typically, the surface layer is grayish brown, calcareous loam. The subsoil is pale brown and light gray, calcareous loam. The underlying material is light gray, calcareous loam.

The moderately well drained Prosper soils are on foot slopes. Slopes range from 0 to 3 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown clay loam and brown, calcareous clay loam in the upper part and light yellowish brown, calcareous loam in the lower part. The underlying material is light gray, mottled, calcareous loam.

Of minor extent in this association are Crossplain, Davison, Dudley, Houdek, Plankinton, and Tetonka soils. The somewhat poorly drained Crossplain soils are on toe slopes. The moderately well drained Davison soils are calcareous throughout. They are on foot slopes and toe slopes. The sodium-affected Dudley soils are on back slopes. Houdek soils have an accumulation of clay in the subsoil. They are in landscape positions similar to those of the Clarno soils.

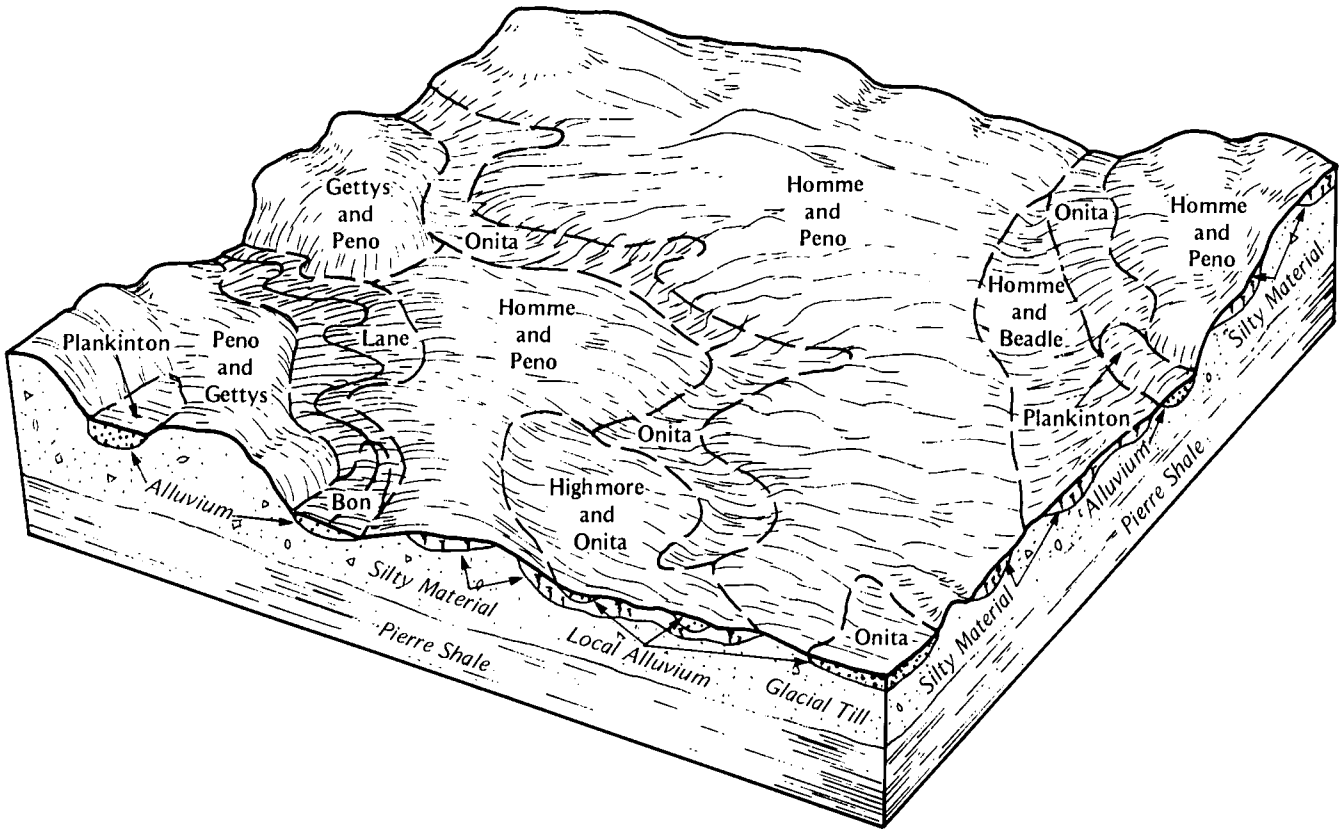

Figure 3.—Pattern of soils and parent material in the Homme-Peno association.

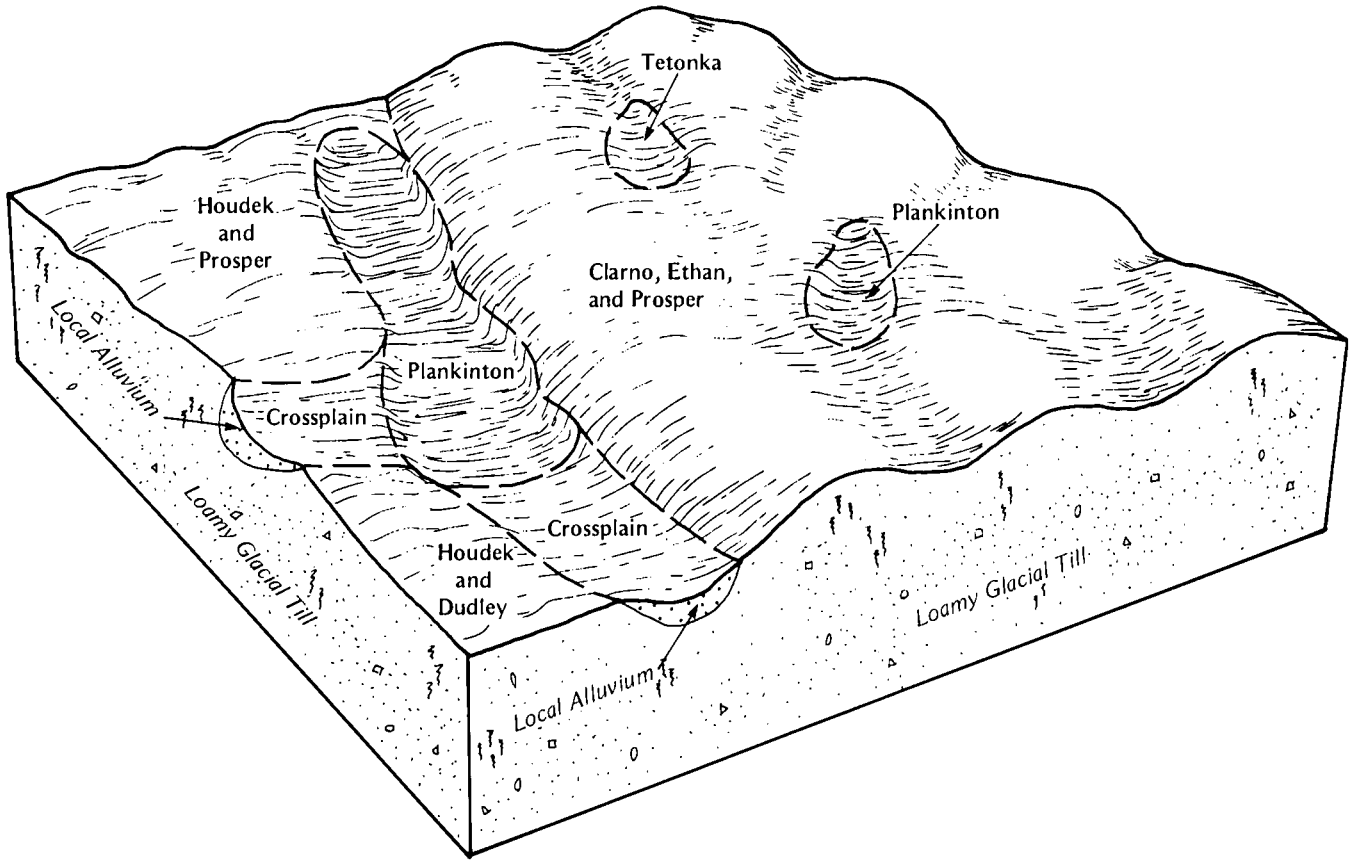

Figure 4.—Pattern of soils and parent material in the Clarno-Ethan-Prosper association.

The poorly drained Plankinton and Tetonka soils are in basins.

About 70 percent of this association is cropland. Alfalfa, corn, small grain, and sorghum are the main crops. Conserving moisture, controlling erosion, and maintaining fertility are the main concerns in managing cultivated areas. The major soils are suited to cultivated crops and to tame pasture and hay. Some areas support native grasses.

6. Clarno-Prosper Association

Well drained and moderately well drained, nearly level to undulating, loamy soils on till plains

This association is characterized by very slight undulations. Slopes generally are nearly level and smooth. They are undulating in places. The drainage pattern is somewhat poorly defined in most areas where drainageways terminate in small basins. It is well defined along the larger drainageways.

This association makes up about 8 percent of the county. It is about 50 percent Houdek and similar soils, 15 percent Prosper and similar soils, and 35 percent minor soils.

The well drained Clarno soils are on summits and back slopes. Slopes are smooth and range from 0 to 5 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is brown and pale brown loam. It is calcareous in the lower part. The underlying material is pale brown, calcareous loam.

The moderately well drained Prosper soils are on foot slopes. Slopes range from 0 to 3 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown clay loam and brown, calcareous clay loam in the upper part and light yellowish brown, calcareous loam in the lower part. The underlying material is light gray, mottled, calcareous loam.

Of minor extent in this association are the moderately well drained, sodium-affected Dudley soils on back slopes and foot slopes; the well drained, calcareous Ethan soils on shoulder slopes; and the poorly drained Plankinton and Tetonka soils in basins.

About 85 percent of this association is cropland or

tame pasture. Alfalfa, corn, small grain, and sorghum are the main crops. Conserving moisture is the main concern in managing cultivated areas. The major soils are suited to cultivated crops and to tame pasture and hay.

Level to Gently Sloping, Loamy, Silty, and Clayey Soils on Till Plains and Fans

These soils make up about 12 percent of the county. About 58 percent of the acreage is range. Maintaining tilth and increasing the rate of water intake are the main management concerns.

7. Beadle-Dudley Association

Well drained and moderately well drained, nearly level to gently sloping, loamy and silty soils on till plains

This association is on broad flats. It is characterized by numerous scattered, very slightly concave basins. Slopes generally are nearly level. They are gently sloping along drainageways. The drainage pattern generally is well defined. Drainageways lead to Firesteel Creek.

This association makes up about 10 percent of the county. It is about 45 percent Beadle and similar soils, 20 percent Dudley soils, and 35 percent minor soils.

The well drained Beadle soils are on summits and back slopes. Slopes range from 0 to 6 percent. Typically, the surface layer is dark grayish brown loam. The subsoil is dark grayish brown and grayish brown clay loam. It is calcareous in the lower part. The underlying material is grayish brown, calcareous clay loam.

The moderately well drained Dudley soils are on the lower back slopes and the upper foot slopes. Slopes range from 0 to 6 percent. Typically, the surface layer is dark gray silt loam. The subsurface layer is grayish brown silt loam. The subsoil is dark grayish brown, light brownish gray, and pale olive clay loam. It is calcareous in the lower part. The underlying material is pale olive, calcareous clay loam.

Of minor extent in this association are Gettys, Jerauld, and Lane soils. Gettys soils have a thin surface layer and are on the steepest slopes. Jerauld soils have visible salts within a depth of 16 inches and are on the lower foot slopes. Lane soils are dark to a depth of more than 20 inches. They are on foot slopes.

About 60 percent of this association supports native grasses and is grazed or used for hay. Alfalfa, small grain, and sorghum are the main crops. The major soils are suited to cultivated crops and to tame pasture and hay. Increasing the rate of water intake and maintaining tilth and fertility are the main concerns in managing cultivated areas.

8. Artesian-Lane-Durrstein Variant Association

Moderately well drained and somewhat poorly drained, level and nearly level, clayey and silty soils on fans

This association is on broad foot slopes. The drainage pattern is fairly well defined. Runoff generally flows eastward into Firesteel Creek.

This association makes up about 2 percent of the county. It is about 25 percent Artesian and similar soils, 20 percent Lane and similar soils, 15 percent Durrstein Variant and similar soils, and 40 percent minor soils.

The moderately well drained Artesian soils are on long, smooth foot slopes. Slopes range from 0 to 2 percent. Typically, the surface layer is dark gray, calcareous silty clay. The subsoil is dark gray and grayish brown, calcareous clay. The underlying material is grayish brown and light brownish gray, calcareous clay.

The moderately well drained Lane soils are on nearly level foot slopes. Slopes range from 0 to 2 percent. Typically, the surface layer is dark gray silty clay loam. The subsoil is dark gray and grayish brown silty clay. It is calcareous in the lower part. The underlying material is grayish brown, calcareous silty clay loam.

The somewhat poorly drained Durrstein Variant soils are on the lower foot slopes. Slopes are 0 to 1 percent. Typically, the surface layer is gray silt loam. The subsoil is very dark gray and dark gray clay. It is calcareous in the lower part. The underlying material is light brownish gray, mottled, calcareous clay loam.

Of minor extent in this association are Bon, Bullcreek, Clamo, Dudley, Durrstein, Hand, Houdek, and Jerauld soils. The well drained Bon, Hand, and Houdek soils are in the slightly higher areas. Bullcreek soils have a high content of salts and do not have a claypan in the subsoil. They are in landscape positions similar to those of the Durrstein Variant soils. The somewhat poorly drained Clamo soils are on low flood plains. The moderately well drained Dudley and Jerauld soils are on the lower back slopes and upper foot slopes in the higher areas. The poorly drained Durrstein soils are on low flood plains.

About 55 percent of this association is cropland. Alfalfa, corn, small grain, and sorghum are the main crops. Improving tilth and increasing the rate of water intake are the main concerns in managing cultivated areas. The major soils are suited to cultivated crops and to tame pasture and hay. Production, however, is low in areas of the Durrstein Variant soils. Much of the acreage supports native grasses.

Level, Silty and Clayey Soils on Flood Plains

These soils make up about 3 percent of the county. About 95 percent of the acreage is range. Maintaining

tilth is the main management concern. Flooding is a hazard.

9. Durrstein-Egas Association

Poorly drained, level, silty and clayey soils on flood plains

This association is on low flood plains along some of the larger drainageways. It generally is dissected by meandering channels. The drainage pattern is poorly defined in all areas, except for those near the channels.

This association makes up about 3 percent of the county. It is about 50 percent Durrstein soils, 15 percent Egas soils, and 35 percent minor soils.

The Durrstein soils are on broad, low flood plains. Slopes are less than 1 percent. Typically, the surface layer is gray silt loam. The subsoil is very dark gray silty clay. It is calcareous in the lower part. The underlying material is gray, light olive gray, and olive gray, mottled, calcareous silty clay loam.

The Egas soils are on broad, low flood plains. Slopes are less than 1 percent. Typically, the surface layer is dark gray silty clay. The subsurface layer is dark gray, calcareous silty clay. Below this is a transitional layer of gray, calcareous silty clay. The underlying material is light olive gray and olive gray, calcareous silty clay. Visible salts occur in all layers.

Of minor extent in this association are the moderately well drained Artesian soils, the well drained and moderately well drained Bon soils, the somewhat poorly drained Farmsworth soils, the moderately well drained Lane soils, and the poorly drained Lawet soils. Artesian and Farmsworth soils are on the foot slopes of fans. Bon soils are on high flood plains. Lane soils are on foot slopes. Lawet soils are strongly calcareous. They have more sand and less clay than the Durrstein and Egas soils. Lawet soils are in the slightly higher areas on flood plains.

About 95 percent of this association supports native grasses and is grazed or used for hay. Measures that prevent overgrazing and soil compaction are the main management needs. The major soils generally are unsuited to cultivated crops because of the flooding, low fertility, and the salinity. The Durrstein soils are suited to a narrow range of tame pasture plants.

Moderately Sloping and Gently Rolling to Steep, Loamy Soils on Moraines

These soils dominantly are strongly sloping and steep. They are moderately sloping or gently rolling in places. The soils make up about 13 percent of the county. About 95 percent of the acreage is range.

10. Ethan-Betts Association

Well drained, moderately sloping and gently rolling to steep, loamy soils on moraines

This association is on summits and shoulder slopes along some of the larger drainageways and on escarpments and glacial end moraines. Slopes generally are strongly sloping or steep. They are gently rolling or moderately sloping in some places. The dendritic drainage pattern is well defined. Slopes are convex.

This association makes up about 13 percent of the county. It is about 35 percent Ethan and similar soils, 25 percent Betts and similar soils, and 40 percent minor soils.

The Ethan soils are on shoulder slopes and back slopes. Slopes range from 6 to 30 percent. Typically, the surface layer is very dark grayish brown stony loam. The subsoil is dark grayish brown, calcareous loam in the upper part and grayish brown and light gray, calcareous clay loam in the lower part. The underlying material is light brownish gray, calcareous clay loam.

The Betts soils are on summits and shoulder slopes. Slopes range from 6 to 40 percent. Typically, the surface layer is gray, calcareous stony loam. The subsoil is grayish brown, calcareous loam. The underlying material is light brownish gray, calcareous clay loam.

Of minor extent in this association are Bon, Delmont, Henkin Variant, Houdek, Lane, Prosper, and Talmo soils. Bon soils are dark to a depth of more than 20 inches and are on high flood plains. The somewhat excessively drained Delmont and excessively drained Henkin Variant soils are in landscape positions similar to those of the Betts and Ethan soils. Houdek soils are deeper to lime than the Betts and Ethan soils and are on back slopes. The moderately well drained Lane soils are on the foot slopes of fans. The moderately well drained Prosper soils are on foot slopes. The excessively drained Talmo soils are in landscape positions similar to those of the Betts soils.

About 95 percent of this association supports native grasses and is grazed. A few areas are used for native hay. These soils generally are too steep or too stony for cultivated crops. Some areas of the Ethan soils are suitable for tame pasture or hay. Some of the minor soils are suitable as cropland.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under the heading "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Bon loam, channeled, is a phase of the Bon series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Plankinton-Crossplain complex is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Pits, gravel, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

The names of some map units identified on the detailed soil maps of this county do not fully agree with those identified on the maps in the published surveys of Aurora, Beadle, Brule, Buffalo, Hand, and Sanborn Counties. Differences are the result of variations in the design and composition of the map units or changes and refinements in series concepts.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The "Glossary" defines many of the terms used in describing the soils.

Soil Descriptions

Ad—Alwilda loam

Composition

Alwilda soil and similar inclusions: 90 to 95 percent
Contrasting inclusions: 5 to 10 percent

Setting

Landform: Outwash plains
Landform position: Summits and back slopes
Shape of areas: Irregular
Size of areas: 10 to 300 acres

Typical Profile

Surface layer:
0 to 7 inches—dark gray loam

Subsoil:
7 to 20 inches—dark grayish brown fine sandy loam
20 to 29 inches—brown loamy sand

Underlying layer:
29 to 60 inches—multicolored gravelly loamy sand and gravelly sand

Soil Properties and Qualities

Drainage class: Somewhat excessively drained
Depth class: Very deep
Depth to a contrasting or impervious layer: 20 to 36 inches
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Rapid
Available water capacity: Low or moderate
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Delmont soils, which have gravelly sand within a depth of 20 inches and are in the slightly higher areas

Similar inclusions:
• Soils that have more clay and less sand in the subsoil than the Alwilda soil

Use and Management

Cropland and pasture

Main crops: Alfalfa, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Wind erosion, the low or moderate available water capacity
Management measures:
• Leaving crop residue on the surface, minimizing tillage, establishing field windbreaks, and stripcropping help to control wind erosion and conserve moisture.
• A mulch of crop residue helps to control wind erosion until pasture plants are established.

Interpretive Groups

Land capability classification: IIIe-9
Range site: Sandy
Windbreak suitability group: 6

Af—Arlo loam

Composition

Arlo soil and similar inclusions: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Outwash plains
Landform position: Toe slopes
Shape of areas: Irregular
Size of areas: 10 to 300 acres

Typical Profile

Surface layer:
0 to 7 inches—very dark gray, calcareous loam

Subsoil:
7 to 12 inches—gray, mottled, calcareous clay loam
12 to 18 inches—gray, mottled, calcareous sandy clay loam
18 to 32 inches—light brownish gray, mottled gravelly clay loam

Underlying layer:
32 to 60 inches—multicolored, calcareous gravelly loamy sand

Soil Properties and Qualities

Drainage class: Poorly drained
Depth class: Very deep
Depth to a contrasting or impervious layer: 20 to 40 inches
Depth to the seasonal high water table: 0 to 2 feet
Flooding: Frequency—occasional; duration—brief
Permeability: Moderate in the upper part and rapid in the underlying material
Available water capacity: Low or moderate
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The sodium-affected Durrstein soils in landscape positions similar to those of the Arlo soil

Use and Management

Cropland and pasture

General management considerations:
• The soil is unsuited to cropland.
Suitable pasture plants: Creeping foxtail and reed canarygrass
Management concerns: Wetness
Management measures:
• Restricted grazing during wet periods and proper stocking rates help to maintain maximum productivity and prevent compaction and the deterioration of tilth.

Interpretive Groups

Land capability classification: Vw-1
Range site: Wetland
Windbreak suitability group: 10

Ar—Artesian silty clay

Composition

Artesian soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Fans
Landform position: Foot slopes
Shape of areas: Irregular
Size of areas: 10 to 50 acres

Typical Profile

Surface layer:
0 to 7 inches—dark gray, calcareous silty clay
Subsoil:
7 to 17 inches—dark gray, calcareous clay
17 to 26 inches—grayish brown, calcareous clay that has accumulations of gypsum
Underlying layer:
26 to 60 inches—grayish brown and light brownish gray, calcareous clay that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: 3 to 6 feet
Flooding: Rare
Permeability: Slow
Available water capacity: Moderate or high
Organic matter content: Moderate or high
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Bullcreek soils, which have more salts than the Artesian soil and are in similar landscape positions
• The sodium-affected Durrstein and Farmsworth soils on the lower foot slopes
• Lane soils, which do not have a seasonal high water table and are on foot slopes
Similar inclusions:
• Soils that have a surface layer of silty clay loam

Use and Management

Cropland and pasture

Main crops: Alfalfa
Suitable pasture plants: Alfalfa, intermediate wheatgrass, smooth bromegrass, and switchgrass
Management concerns: Wetness that delays fieldwork in some years, the slow rate of water intake, compaction during wet periods
Management measures:
• Leaving crop residue on the surface and including grasses and legumes in the cropping system improve tilth.
• Chiseling and subsoiling break up the dense subsoil and increase the rate of water intake.

Interpretive Groups

Land capability classification: IIw-2
Range site: Subirrigated
Windbreak suitability group: 1

At—Artesian-Bullcreek complex

Composition

Artesian soil and similar inclusions: 45 to 55 percent
Bullcreek soil and similar inclusions: 35 to 45 percent
Contrasting inclusions: 5 to 10 percent

Setting

Landform: Fans
Landform position: Artesian—upper foot slopes; Bullcreek—lower foot slopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 30 to 200 acres

Typical Profile

Artesian

Surface layer:
0 to 7 inches—dark gray, calcareous silty clay
Subsoil:
7 to 17 inches—dark gray, calcareous clay
17 to 26 inches—grayish brown, calcareous clay that has accumulations of gypsum
Underlying layer:
26 to 60 inches—grayish brown and light brownish gray, calcareous clay that has accumulations of gypsum

Bullcreek

Surface layer:
0 to 4 inches—dark gray clay
Subsoil:
4 to 9 inches—dark gray, calcareous clay
9 to 16 inches—gray, calcareous clay that has accumulations of salts
Underlying layer:
16 to 60 inches—gray and light olive gray, calcareous clay that has accumulations of salts

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: 3 to 6 feet
Flooding: None
Permeability: Artesian—slow; Bullcreek—very slow
Available water capacity: Artesian—moderate or high; Bullcreek—low or moderate
Organic matter content: Artesian—high; Bullcreek—moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The sodium-affected Durrstein soils in landscape positions similar to those of the Bullcreek soil

Use and Management

Cropland and pasture

General management considerations:
• The Bullcreek soil generally is unsuited to cultivated crops.
Main crops: Alfalfa, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Wetness that delays fieldwork in some years, compaction
Management measures:
• Leaving crop residue on the surface and including grasses and legumes in the cropping system improve tilth.
• Chiseling and subsoiling break up the dense subsoil and increase the rate of water intake.

Interpretive Groups

Land capability classification: Artesian—IIw-2; Bullcreek—VIs-5
Range site: Artesian—Subirrigated; Bullcreek—Dense Clay
Windbreak suitability group: Artesian—1; Bullcreek—10

Av—Artesian-Durrstein Variant complex

Composition

Artesian soil and similar inclusions: 55 to 65 percent
Durrstein Variant soil and similar inclusions: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Fans
Landform position: Artesian—upper foot slopes; Durrstein Variant—lower foot slopes
Slope range: Artesian—0 to 2 percent; Durrstein Variant—0 to 1 percent
Shape of areas: Irregular
Size of areas: 25 to more than 100 acres

Typical Profile

Artesian

Surface layer:
0 to 7 inches—dark gray, calcareous silty clay
Subsoil:
7 to 17 inches—dark gray, calcareous clay
17 to 26 inches—grayish brown, calcareous clay that has accumulations of gypsum
Underlying layer:
26 to 60 inches—grayish brown and light brownish gray, calcareous clay that has accumulations of gypsum

Durrstein Variant

Surface layer:
0 to 3 inches—gray silt loam
Subsoil:
3 to 5 inches—very dark gray clay
5 to 13 inches—very dark gray, calcareous clay
13 to 21 inches—very dark gray, calcareous clay that has accumulations of salts
21 to 36 inches—dark gray, calcareous clay that has accumulations of salts
Underlying layer:
36 to 60 inches—light brownish gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Artesian—moderately well drained; Durrstein Variant—somewhat poorly drained
Depth class: Very deep
Depth to the seasonal high water table: 3 to 6 feet
Flooding: Rare
Permeability: Slow
Available water capacity: Artesian—moderate or high; Durrstein Variant—moderate
Organic matter content: Artesian—moderate or high; Durrstein Variant—low
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The well drained Bon soils in the slightly higher landscape positions
• The sodium-affected Farmsworth soils, which do not have visible salts within a depth of 16 inches and are in the lower areas
Similar inclusions:
• Artesian soils that have a surface layer of silty clay loam

Use and Management

Cropland and pasture

General management considerations:
• The Durrstein Variant soil generally is unsuited to cultivated crops.
Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, smooth bromegrass, switchgrass, and western wheatgrass
Management concerns: Wetness that delays fieldwork in some years, compaction during wet periods, tilth maintenance

Management measures:
• Leaving crop residue on the surface and including grasses and legumes in the cropping system improve tilth.
• Chiseling and subsoiling break up the dense subsoil and increase the rate of water intake.

Interpretive Groups

Land capability classification: Artesian—IIw-2; Durrstein Variant—VIs-1
Range site: Artesian—Subirrigated; Durrstein Variant—Thin Claypan
Windbreak suitability group: Artesian—1; Durrstein Variant—10

Ba—Baltic silty clay

Composition

Baltic soil and similar inclusions: 85 to 99 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Flood plains
Landform position: Low flood plains
Shape of areas: Irregular
Size of areas: 10 to 200 acres

Typical Profile

Surface layer:
0 to 8 inches—very dark gray silty clay

Subsoil:
8 to 39 inches—very dark gray, calcareous silty clay

Underlying layer:
39 to 60 inches—gray, calcareous silty clay that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Poorly drained
Depth class: Very deep
Depth to the seasonal high water table: 0 to 2 feet
Flooding: Frequency—occasional; duration—brief
Permeability: Slow
Available water capacity: Moderate or high
Organic matter content: High
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Arlo soils, which have gravelly material within a depth of 40 inches and are in the slightly higher landscape positions
• The sodium-affected Durrstein soils in landscape positions similar to those of the Baltic soil

Similar inclusions:
• Soils that have an overburden of loam, silt loam, or silty clay loam

Use and Management

Cropland and pasture

General management considerations:
• The soil is unsuited to cropland.
Suitable pasture plants: Creeping foxtail and reed canarygrass
Management concerns: Wetness, surface compaction
Management measures:
• Proper stocking rates and timely deferment of grazing or rotation grazing prevent compaction and the deterioration of tilth and help to maintain maximum productivity.

Interpretive Groups

Land capability classification: Vw-1
Range site: Wetland
Windbreak suitability group: 10

BdA—Beadle loam, 0 to 2 percent slopes

Composition

Beadle soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Summits and back slopes
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 18 inches—dark grayish brown clay loam
18 to 36 inches—grayish brown, calcareous clay loam
36 to 45 inches—grayish brown, mottled, calcareous clay loam

Underlying layer:
45 to 60 inches—grayish brown, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High

Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The sodium-affected Dudley and Jerauld soils on foot slopes
• Homme soils, which have less sand in the subsoil than the Beadle soil and are in similar landscape positions
• The moderately well drained Onita soils on foot slopes
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Soils that have less clay in the upper part of the subsoil than the Beadle soil
• Soils that have lime within a depth of 12 inches

Use and Management

Cropland and pasture

Main crops: Alfalfa, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Conserving moisture, improving tilth, increasing the rate of water intake
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system conserve moisture, improve tilth, and increase the rate of water intake.
• Chiseling and subsoiling improve tilth and increase the rate of water intake.

Interpretive Groups

Land capability classification: IIs-1
Range site: Clayey
Windbreak suitability group: 4

BdB—Beadle loam, 2 to 6 percent slopes

Composition

Beadle soil and similar inclusions: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Landform position: Summits and back slopes
Shape of areas: Irregular
Size of areas: 5 to 80 acres

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 18 inches—dark grayish brown clay loam
18 to 36 inches—grayish brown, calcareous clay loam
36 to 45 inches—grayish brown, mottled, calcareous clay loam

Underlying layer:
45 to 60 inches—grayish brown, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Moderate
Surface runoff: Medium

Inclusions

Contrasting inclusions:
• The moderately well drained Lane and Onita soils on foot slopes
• Prosper soils, which have less clay than the Beadle soil and are on foot slopes
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Soils that have less clay in the upper part of the subsoil than the Beadle soil
• Soils that have lime within a depth of 12 inches

Use and Management

Cropland and pasture

Main crops: Alfalfa, small grain, and sorghum
Suitable pasture plants: Alfalfa, green needlegrass, intermediate wheatgrass, and smooth bromegrass
Management concerns: Controlling water erosion, improving tilth, increasing the rate of water intake
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion.
• Chiseling and subsoiling improve tilth and increase the rate of water intake.
• Contour farming, grassed waterways, and terraces help to control erosion, but slopes in most areas are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: IIIe-3
Range site: Clayey
Windbreak suitability group: 4

BgB—Beadle-Jerauld-Dudley complex, 1 to 5 percent slopes

Composition

Beadle soil and similar inclusions: 40 to 50 percent
Jerauld soil and similar inclusions: 20 to 40 percent
Dudley soil and similar inclusions: 15 to 25 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Beadle—summits and back slopes; Jerauld—lower back slopes and lower foot slopes; Dudley—upper back slopes and upper foot slopes
Slope range: Beadle—1 to 5 percent; Jerauld and Dudley—1 to 3 percent
Shape of areas: Irregular
Size of areas: 10 to more than 100 acres

Typical Profile

Beadle

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 18 inches—dark grayish brown clay loam
18 to 36 inches—grayish brown, calcareous clay loam
36 to 45 inches—grayish brown, mottled, calcareous clay loam

Underlying layer:
45 to 60 inches—grayish brown, mottled, calcareous clay loam

Jerauld

Surface layer:
0 to 3 inches—gray loam

Subsoil:
3 to 9 inches—dark gray and dark grayish brown clay
9 to 17 inches—dark grayish brown clay that has accumulations of salts
17 to 21 inches—grayish brown, calcareous clay loam that has accumulations of salts
21 to 41 inches—light brownish gray, calcareous clay loam that has accumulations of salts

Underlying layer:
41 to 60 inches—light brownish gray, mottled, calcareous clay loam

Dudley

Surface layer:
0 to 4 inches—dark gray silt loam

Subsurface layer:
4 to 6 inches—grayish brown silt loam

Subsoil:
6 to 21 inches—grayish brown and dark grayish brown clay loam
21 to 45 inches—light brownish gray and pale olive, calcareous clay loam that has accumulations of salts

Underlying layer:
45 to 60 inches—pale olive, calcareous clay loam

Soil Properties and Qualities

Drainage class: Beadle—well drained; Jerauld and Dudley—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Beadle—moderately slow; Jerauld and Dudley—slow
Available water capacity: Beadle—high; Jerauld and Dudley—moderate
Organic matter content: Beadle and Dudley—moderate; Jerauld—low
Surface runoff: Beadle—medium; Jerauld and Dudley—slow

Inclusions

Contrasting inclusions:
• Ethan soils, which have lime at or near the surface and are on shoulder slopes
• The poorly drained Plankinton soils in basins

Similar inclusions:
• Soils that have less clay in the upper part of the subsoil than the Beadle soil
• Beadle soils that have lime within a depth of 12 inches

Use and Management

Cropland and pasture

General management considerations:
• Crop growth is severely restricted in areas of the Jerauld soil.
Main crops: Alfalfa, small grain, and sorghum
Suitable pasture plants: Alfalfa and intermediate wheatgrass in areas of the Beadle and Dudley soils
Management concerns: Erosion, a sodium-affected subsoil in the Jerauld and Dudley soils that adversely affects crop growth by restricting root penetration and the rate of water intake, deterioration of soil tilth caused by tilling when the soils are wet
Management measures:
• Minimizing tillage, applying animal manure, leaving crop residue on the surface, and including grasses and legumes in the cropping system conserve moisture and help to control erosion.

• Subsoiling and chiseling improve tilth and increase the rate of water intake for a short period.

Interpretive Groups

Land capability classification: Beadle—IIIe-3; Jerauld—VIs-1; Dudley—IVs-3
Range site: Beadle—Clayey; Jerauld—Thin Claypan; Dudley—Claypan
Windbreak suitability group: Beadle—4; Jerauld—10; Dudley—9

BIB—Beadle-Lane complex, 1 to 5 percent slopes

Composition

Beadle soil and similar inclusions: 40 to 50 percent
Lane soil and similar inclusions: 40 to 50 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Beadle—till plains; Lane—fans
Landform position: Beadle—upper foot slopes; Lane—lower foot slopes
Slope range: 1 to 5 percent
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Beadle

Surface layer:
0 to 5 inches—dark grayish brown loam
Subsoil:
5 to 18 inches—dark grayish brown clay loam
18 to 36 inches—grayish brown, calcareous clay loam
36 to 45 inches—grayish brown, mottled, calcareous clay loam
Underlying layer:
45 to 60 inches—grayish brown, mottled, calcareous clay loam

Lane

Surface layer:
0 to 8 inches—dark gray silty clay loam
Subsoil:
8 to 22 inches—dark gray silty clay
22 to 30 inches—dark gray, calcareous silty clay
30 to 50 inches—grayish brown, calcareous silty clay
Underlying layer:
50 to 60 inches—grayish brown, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Beadle—well drained; Lane—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Beadle—moderately slow; Lane—slow
Available water capacity: Beadle—high; Lane—moderate or high
Organic matter content: Beadle—moderate; Lane—high
Surface runoff: Medium

Inclusions

Contrasting inclusions:
• The sodium-affected Dudley and Jerauld soils on the lower foot slopes
Similar inclusions:
• Soils that have less clay in the subsoil than the Beadle soil
• Beadle soils that have lime within a depth of 12 inches

Use and Management

Cropland and pasture

Main crops: Alfalfa, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Erosion, tilth, the slow rate of water intake
Management measures:
• Including grasses and legumes in the cropping system, minimizing tillage, and leaving crop residue on the surface conserve moisture and help to control erosion.
• Chiseling and subsoiling improve tilth and increase the rate of water intake.

Interpretive Groups

Land capability classification: Beadle—IIIe-3; Lane—IIs-1
Range site: Clayey
Windbreak suitability group: Beadle—4; Lane—3

BmD—Betts-Ethan loams, 6 to 40 percent slopes, stony

Composition

Betts soil and similar inclusions: 40 to 50 percent
Ethan soil and similar inclusions: 30 to 40 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Moraines (fig. 5)
Landform position: Betts—summits and shoulder slopes; Ethan—back slopes
Slope range: Betts—15 to 40 percent; Ethan—6 to 15 percent
Shape of areas: Long and narrow
Size of areas: 15 to 300 acres

Figure 5.—An area of Betts-Ethan loams, 6 to 40 percent slopes, stony, in the foreground.

Typical Profile

Betts

Surface layer:
0 to 2 inches—gray, calcareous stony loam

Subsoil:
2 to 6 inches—grayish brown, calcareous loam
6 to 22 inches—grayish brown, mottled, calcareous loam

Underlying layer:
22 to 60 inches—light brownish gray, mottled, calcareous clay loam

Ethan

Surface layer:
0 to 4 inches—very dark grayish brown, calcareous stony loam

Subsoil:
4 to 22 inches—dark grayish brown, calcareous loam

22 to 36 inches—grayish brown and light gray, mottled, calcareous clay loam

Underlying layer:
36 to 60 inches—light brownish gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Low or moderate
Surface runoff: Rapid

Inclusions

Contrasting inclusions:
• The well drained and moderately well drained Bon soils on the narrow flood plains
• Davis soils, which are dark to a depth of more than 20 inches and are on foot slopes
• Houdek soils, which are deeper to lime than the Betts and Ethan soils and are on back slopes
• Talmo soils, which have gravelly sand within a depth of 14 inches and are on summits and shoulder slopes

Similar inclusions:
• Soils that have more clay between depths of 10 and 40 inches than the Betts soil

Use and Management

Cropland and pasture

General management considerations:
• The soils are unsuited to cropland and pasture.
Management concerns: Numerous stones and boulders, water erosion, granitic rocks 1 to 3 feet in diameter that cover less than 0.1 percent of the surface
Management measures:
• Cross-fencing and timely deferment of grazing or rotation grazing help to control water erosion.

Interpretive Groups

Land capability classification: VIIs-6
Range site: Betts—Thin Upland; Ethan—Silty
Windbreak suitability group: 10

BoE—Betts-Ethan loams, 15 to 40 percent slopes

Composition

Betts soil and similar inclusions: 50 to 60 percent
Ethan soil and similar inclusions: 30 to 40 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Moraines
Landform position: Betts—summits and shoulder slopes; Ethan—back slopes
Slope range: Betts—15 to 40 percent; Ethan—15 to 30 percent
Shape of areas: Irregular or oblong
Size of areas: 15 to more than 200 acres

Typical Profile

Betts

Surface layer:
0 to 2 inches—gray, calcareous loam

Subsoil:
2 to 6 inches—grayish brown, calcareous loam
6 to 22 inches—grayish brown, mottled, calcareous loam

Underlying layer:
22 to 60 inches—light brownish gray, mottled, calcareous clay loam

Ethan

Surface layer:
0 to 8 inches—grayish brown, calcareous loam

Subsoil:
8 to 22 inches—pale brown, calcareous loam
22 to 37 inches—light gray, mottled, calcareous loam

Underlying layer:
37 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Low or moderate
Surface runoff: Rapid

Inclusions

Contrasting inclusions:
• Davis soils, which are dark to a depth of more than 20 inches and are on foot slopes
• Houdek soils, which are deeper to lime than the Betts and Ethan soils and are on the lower back slopes
• Talmo soils, which have gravelly sand within a depth of 14 inches and are on summits and shoulder slopes

Similar inclusions:
• Soils that have more clay throughout than the Betts soil
• Soils that have a surface layer that is thinner than that of the Ethan soil

Use and Management

Cropland and pasture

General management considerations:
• The soils are unsuited to cropland and pasture.
Management concerns: Water erosion on overgrazed rangeland
Management measures:
• Cross-fencing and timely deferment of grazing or rotation grazing help to control erosion.

Interpretive Groups

Land capability classification: VIIe-3
Range site: Betts—Thin Upland; Ethan—Silty
Windbreak suitability group: 10

Br—Bon loam

Composition

Bon soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Flood plains
Landform position: High flood plains
Shape of areas: Irregular
Size of areas: 10 to 80 acres

Typical Profile

Surface layer:
0 to 10 inches—dark gray loam
Subsoil:
10 to 18 inches—dark grayish brown loam
18 to 40 inches—dark gray and dark grayish brown, calcareous loam
40 to 57 inches—grayish brown and dark grayish brown, mottled, calcareous loam
Underlying layer:
57 to 60 inches—grayish brown, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: Rare
Permeability: Moderate
Available water capacity: High
Organic matter content: High
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The sodium-affected Durrstein soils in the lower landscape positions
• The saline, poorly drained Egas soils in landscape positions lower than those of the Bon soil
• Enet soils, which have gravelly material within a depth of 40 inches and are in landscape positions similar to those of the Bon soil
• Lane soils, which have more clay than the Bon soil and are in similar landscape positions

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, and small grain
Suitable pasture plants: Alfalfa, intermediate wheatgrass, smooth bromegrass, and switchgrass
Management concerns: Conserving moisture during dry periods
Management measures:
• Leaving crop residue on the surface and minimizing tillage conserve moisture.

Interpretive Groups

Land capability classification: IIc-3
Range site: Overflow
Windbreak suitability group: 1

Bv—Bon loam, channeled

Composition

Bon soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Flood plains (fig. 6)
Landform position: High flood plains that are dissected into many small tracts by narrow channels and partly filled stream meanders
Shape of areas: Long and narrow
Size of areas: 10 to more than 200 acres

Typical Profile

Surface layer:
0 to 10 inches—dark gray loam
Subsoil:
10 to 18 inches—dark grayish brown loam
18 to 40 inches—dark gray and dark grayish brown, calcareous loam
40 to 57 inches—grayish brown and dark grayish brown, mottled, calcareous loam
Underlying layer:
57 to 60 inches—grayish brown, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep

Figure 6.—An area of Bon loam, channeled, that is surrounded by strongly sloping to steep areas.

Depth to the seasonal high water table: 2 to 6 feet
Flooding: Frequency—frequent; duration—brief
Permeability: Moderate
Available water capacity: High
Organic matter content: High
Surface runoff: Slow

Inclusions

Contrasting inclusions:
- The sodium-affected Durrstein soils in the lower landscape positions
- The saline, poorly drained Egas soils in landscape positions lower than those of the Bon soil
- Enet soils, which have gravelly material within a depth of 40 inches and are in landscape positions similar to those of the Bon soil
- The clayey Lane soils in landscape positions similar to those of the Bon soil

Similar inclusions:
- Soils that have strata of silty clay or clay

• Soils that have gravelly material at a depth of 40 to 60 inches

Use and Management

Cropland and pasture

General management considerations:

• Because of the meandering channels and the flooding, the soil generally is unsuited to cultivated crops; most of the acreage supports native grasses and is grazed.

Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass

Management measures:

• Proper stocking rates and timely deferment of grazing or rotation grazing help to maintain maximum productivity.

Interpretive Groups

Land capability classification: VIw-1
Range site: Overflow
Windbreak suitability group: 1

CdB—Canning-Delmont loams, 2 to 6 percent slopes

Composition

Canning soil and similar inclusions: 45 to 55 percent
Delmont soil and similar inclusions: 35 to 45 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Outwash plains
Landform position: Canning—back slopes; Delmont—summits and shoulder slopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 10 to 80 acres

Typical Profile

Canning

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 16 inches—grayish brown clay loam
16 to 33 inches—brown and light brownish gray, calcareous clay loam

Underlying layer:
33 to 60 inches—multicolored, calcareous gravelly sand

Delmont

Surface layer:
0 to 8 inches—dark grayish brown loam

Subsoil:
8 to 15 inches—dark grayish brown loam
15 to 19 inches—multicolored, calcareous gravelly sand

Underlying layer:
19 to 60 inches—multicolored, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Canning—well drained; Delmont—somewhat excessively drained
Depth class: Very deep
Depth to a contrasting or impervious layer: Canning—20 to 40 inches; Delmont—14 to 20 inches
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderate in the upper part and rapid in the gravelly underlying material
Available water capacity: Canning—moderate; Delmont—low
Organic matter content: Moderate
Surface runoff: Medium

Inclusions

Contrasting inclusions:

• Ree soils, which do not have gravelly material within a depth of 40 inches and are on the lower back slopes

Similar inclusions:

• Soils that are dark below a depth of 20 inches
• Soils that have gravelly material within a depth of 14 inches

Use and Management

Cropland and pasture

Main crops: Small grain
Suitable pasture plants: Crested wheatgrass and pubescent wheatgrass
Management concerns: Erosion, the low or moderate available water capacity
Management measures:

• Leaving crop residue on the surface and minimizing tillage help to control erosion and conserve moisture.

Interpretive Groups

Land capability classification: Canning—IIIe-6; Delmont—IVe-6
Range site: Canning—Silty; Delmont—Shallow to Gravel
Windbreak suitability group: 6

Cm—Clamo silty clay loam

Composition

Clamo soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Flood plains
Landform position: Low flood plains

Shape of areas: Irregular
Size of areas: 40 to more than 200 acres

Typical Profile

Surface layer:
0 to 8 inches—very dark gray silty clay loam

Subsoil:
8 to 17 inches—very dark gray silty clay
17 to 22 inches—very dark gray, calcareous silty clay
22 to 40 inches—dark grayish brown and dark gray, calcareous silty clay

Underlying layer:
40 to 60 inches—gray and olive gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Depth class: Very deep
Depth to the seasonal high water table: 0.5 foot to 3.0 feet
Flooding: Frequency—occasional; duration—long
Permeability: Slow
Available water capacity: High
Organic matter content: High
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The well drained and moderately well drained Bon soils, which have less clay than the Clamo soil and are in the slightly higher landscape positions
• The poorly drained Durrstein and Egas soils, which have accumulations of salts and are in the lower landscape positions
• The moderately well drained Lane soils in the slightly higher landscape positions

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, big bluestem, smooth bromegrass, and switchgrass
Management concerns: Wetness, compaction
Management measures:
• Leaving crop residue on the surface, deferring tillage when the soil is wet, and including grasses and legumes in the cropping system improve tilth and increase the rate of water intake.
• Chiseling and subsoiling increase the rate of water intake.

Interpretive Groups

Land capability classification: IIIw-3
Range site: Overflow
Windbreak suitability group: 2

CpB—Clarno-Ethan-Prosper loams, 1 to 5 percent slopes

Composition

Clarno soil and similar inclusions: 40 to 60 percent
Ethan soil and similar inclusions: 20 to 35 percent
Prosper soil and similar inclusions: 15 to 25 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Till plains (fig. 7)
Landform position: Clarno—summits and back slopes; Ethan—shoulder slopes; Prosper—foot slopes
Slope range: Clarno and Ethan—2 to 5 percent; Prosper—1 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to more than 100 acres

Typical Profile

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 14 inches—brown loam
14 to 20 inches—pale brown, calcareous loam
20 to 39 inches—pale brown, mottled, calcareous loam

Underlying layer:
39 to 60 inches—pale brown, mottled, calcareous loam

Ethan

Surface layer:
0 to 8 inches—grayish brown, calcareous loam

Subsoil:
8 to 22 inches—pale brown, calcareous loam
22 to 37 inches—light gray, mottled, calcareous loam

Underlying layer:
37 to 60 inches—light gray, mottled, calcareous loam

Prosper

Surface layer:
0 to 10 inches—dark grayish brown loam

Subsoil:
10 to 23 inches—dark grayish brown clay loam
23 to 27 inches—brown, calcareous clay loam
27 to 41 inches—light yellowish brown, calcareous loam

Underlying layer:
41 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Clarno and Ethan—well drained; Prosper—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Clarno and Ethan—more than 6 feet; Prosper—3 to 6 feet

Figure 7.—An area of Clarno-Ethan-Prosper loams, 1 to 5 percent slopes. Clarno loam has the darker surface and is on the back slopes. Ethan loam is lighter colored and is on the shoulder slopes. Prosper loam is on the foot slopes.

Flooding: None
Permeability: Moderately slow
Available water capacity: High

Organic matter content: Clarno—moderate; Ethan—low; Prosper—high
Surface runoff: Clarno and Ethan—medium; Prosper—slow

Inclusions

Contrasting inclusions:
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Soils that have slightly more clay in the upper part than the Clarno soil
• Soils that are more stratified in the underlying material than the Clarno soil
• Ethan soils that have a dark surface layer less than 7 inches thick
• Prosper soils that have a subsoil that is loam throughout

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Water erosion, a high content of lime in the Ethan soil that adversely affects the availability of plant nutrients
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility.
• Contour farming, grassed waterways, and terraces help to control erosion, but slopes in most areas are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: Clarno—IIe-2; Ethan—IIIe-12; Prosper—IIc-3
Range site: Clarno and Ethan—Silty; Prosper—Overflow
Windbreak suitability group: Clarno—3; Ethan—8; Prosper—1

CpC—Clarno-Ethan-Prosper loams, 2 to 9 percent slopes

Composition

Clarno soil and similar inclusions: 40 to 55 percent
Ethan soil and similar inclusions: 25 to 40 percent
Prosper soil and similar inclusions: 15 to 25 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Till plains
Landform position: Clarno—summits and back slopes; Ethan—shoulder slopes; Prosper—foot slopes
Slope range: Clarno—3 to 9 percent; Ethan—5 to 9 percent; Prosper—2 to 3 percent
Shape of areas: Irregular
Size of areas: 10 to more than 100 acres

Typical Profile

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam
Subsoil:
7 to 14 inches—brown loam
14 to 20 inches—pale brown, calcareous loam
20 to 39 inches—pale brown, mottled, calcareous loam
Underlying layer:
39 to 60 inches—pale brown, mottled, calcareous loam

Ethan

Surface layer:
0 to 8 inches—grayish brown, calcareous loam
Subsoil:
8 to 22 inches—pale brown, calcareous loam
22 to 37 inches—light gray, mottled, calcareous loam
Underlying layer:
37 to 60 inches—light gray, mottled, calcareous loam

Prosper

Surface layer:
0 to 10 inches—dark grayish brown loam
Subsoil:
10 to 23 inches—dark grayish brown clay loam
23 to 27 inches—brown, calcareous clay loam
27 to 41 inches—light yellowish brown, calcareous loam
Underlying layer:
41 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Clarno and Ethan—well drained; Prosper—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Clarno and Ethan—more than 6 feet; Prosper—3 to 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Clarno—moderate; Ethan—low; Prosper—high
Surface runoff: Clarno and Ethan—medium; Prosper—slow

Inclusions

Contrasting inclusions:
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Soils that have slightly more clay in the upper part than the Clarno soil

• Soils that are more stratified in the underlying material than the Clarno soil
• Ethan soils that have a dark surface layer less than 7 inches thick
• Prosper soils that have a subsoil that is loam throughout

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Water erosion, a high content of lime in the Ethan soil that adversely affects the availability of plant nutrients
Management measures:
• Minimizing tillage, leaving crop residue on the surface, planting close-sown crops, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility.
• Terracing, contour farming, and grassed waterways help to control erosion, but slopes in most areas are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: Clarno—IIIe-2; Ethan—IVe-3; Prosper—IIc-3
Range site: Clarno and Ethan—Silty; Prosper—Overflow
Windbreak suitability group: Clarno—3; Ethan—8; Prosper—1

CrA—Clarno-Prosper loams, 0 to 2 percent slopes

Composition

Clarno soil and similar inclusions: 50 to 60 percent
Prosper soil and similar inclusions: 20 to 30 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Clarno—summits and back slopes; Prosper—foot slopes
Slope range: Clarno—1 to 2 percent; Prosper—0 to 1 percent
Shape of areas: Irregular
Size of areas: 10 to more than 200 acres

Typical Profile

Clarno

Surface layer:
0 to 7 inches—dark grayish brown loam
Subsoil:
7 to 14 inches—brown loam
14 to 20 inches—pale brown, calcareous loam
20 to 39 inches—pale brown, mottled, calcareous loam
Underlying layer:
39 to 60 inches—pale brown, mottled, calcareous loam

Prosper

Surface layer:
0 to 10 inches—dark grayish brown loam
Subsoil:
10 to 23 inches—dark grayish brown clay loam
23 to 27 inches—brown, calcareous clay loam
27 to 41 inches—light yellowish brown, calcareous loam
Underlying layer:
41 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Clarno—well drained; Prosper—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Clarno—more than 6 feet; Prosper—3 to 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Clarno—moderate; Prosper—high
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Ethan soils, which have lime at or near the surface and are on shoulder slopes
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Soils that have slightly more clay in the subsoil than the Clarno soil
• Soils that are more stratified in the underlying material than the Clarno soil
• Soils that have less clay in the subsoil than the Prosper soil

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Conserving moisture
Management measures:
• Leaving crop residue on the surface conserves moisture.

Interpretive Groups

Land capability classification: Clarno—IIc-2; Prosper—IIc-3

Range site: Clarno—Silty; Prosper—Overflow
Windbreak suitability group: Clarno—3; Prosper—1

DaA—Davis loam, 0 to 2 percent slopes

Composition

Davis soil and similar inclusions: 90 to 95 percent
Contrasting inclusions: 5 to 10 percent

Setting

Landform: Fans
Landform position: Foot slopes
Shape of areas: Long and narrow
Size of areas: 5 to 150 acres

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown loam
Subsoil:
9 to 34 inches—very dark grayish brown loam
34 to 42 inches—dark grayish brown, calcareous loam
42 to 56 inches—grayish brown, calcareous clay loam
56 to 60 inches—light brownish gray, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderate
Available water capacity: High
Organic matter content: High
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Houdek soils, which are not dark below a depth of 20 inches and are in the higher areas
Similar inclusions:
• Soils that have lime within a depth of 20 inches
• Soils that have a subsoil that is silty clay loam throughout

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, smooth bromegrass, and switchgrass
Management concerns: Inadequate moisture for long-season crops in most years
Management measures:
• Leaving crop residue on the surface and minimizing tillage conserve moisture.

Interpretive Groups

Land capability classification: IIc-3
Range site: Silty
Windbreak suitability group: 3

DaB—Davis loam, 2 to 9 percent slopes

Composition

Davis soil and similar inclusions: 90 to 95 percent
Contrasting inclusions: 5 to 10 percent

Setting

Landform: Fans
Landform position: Foot slopes
Shape of areas: Long and narrow or irregular
Size of areas: 5 to 80 acres

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown loam
Subsoil:
9 to 34 inches—very dark grayish brown loam
34 to 42 inches—dark grayish brown, calcareous loam
42 to 56 inches—grayish brown, calcareous clay loam
56 to 60 inches—light brownish gray, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderate
Available water capacity: High
Organic matter content: High
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Houdek soils, which are not dark below a depth of 20 inches and are in the higher areas
Similar inclusions:
• Soils that have lime within a depth of 20 inches
• Soils that have a subsoil that is silty clay loam throughout

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, green needlegrass, intermediate wheatgrass, and smooth bromegrass
Management concerns: Erosion
Management measures:
• Leaving crop residue on the surface, minimizing

tillage, farming on the contour, including grasses and legumes in the cropping system, and terracing help to control erosion and conserve moisture.

Interpretive Groups

Land capability classification: IIe-3
Range site: Silty
Windbreak suitability group: 3

Dc—Davison loam

Composition

Davison soil and similar inclusions: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Till plains
Landform position: Lower foot slopes
Shape of areas: Irregular
Size of areas: 5 to 30 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, calcareous loam

Subsoil:
10 to 18 inches—grayish brown and light brownish gray, calcareous loam

Underlying layer:
18 to 32 inches—light brownish gray, mottled, calcareous loam that has accumulations of gypsum
32 to 54 inches—light brownish gray and light yellowish brown, mottled, calcareous fine sandy loam that has accumulations of gypsum mostly in the upper part
54 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: 2 to 4 feet
Flooding: None
Permeability: Moderate
Available water capacity: Moderate or high
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The well drained Clarno and Ethan soils in the slightly higher landscape positions
• The somewhat poorly drained Crossplain soils on toe slopes
• Prosper soils, which have less lime than the Davison soil and are on foot slopes
• The poorly drained Tetonka soils in basins

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: A high content of lime that adversely affects the availability of plant nutrients and increases the susceptibility to wind erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion.
• Applying animal manure improves fertility.

Interpretive Groups

Land capability classification: IIe-4
Range site: Limy Subirrigated
Windbreak suitability group: 3

DeC—Delmont loam, 6 to 9 percent slopes

Composition

Delmont soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Moraines
Landform position: Summits and back slopes
Shape of areas: Irregular
Size of areas: 10 to 80 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown loam

Subsoil:
8 to 15 inches—dark grayish brown loam
15 to 19 inches—multicolored, calcareous gravelly sand

Underlying layer:
19 to 60 inches—multicolored, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Somewhat excessively drained
Depth class: Very deep
Depth to a contrasting or impervious layer: 14 to 20 inches
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderate in the upper part and rapid in the gravelly underlying material

Available water capacity: Low
Organic matter content: Moderate
Surface runoff: Medium

Inclusions

Contrasting inclusions:
• Canning soils, which are 20 to 40 inches deep over gravelly material and are on the lower back slopes
• Henkin Variant soils, which have more sand in the upper part and are in landscape positions similar to those of the Delmont soil

Similar inclusions:
• Soils that have gravelly sand at a depth of less than 14 inches

Use and Management

Cropland and pasture

General management considerations:
• The soil is unsuited to cropland.
Suitable pasture plants: Crested wheatgrass
Management concerns: Water erosion, the low available water capacity
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: VIe-5
Range site: Shallow to Gravel
Windbreak suitability group: 6

DgA—Delmont-Enet loams, 0 to 2 percent slopes

Composition

Delmont soil and similar inclusions: 60 to 80 percent
Enet soil and similar inclusions: 20 to 30 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Outwash plains
Landform position: Delmont—summits and shoulder slopes; Enet—back slopes and upper foot slopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 200 acres

Typical Profile

Delmont

Surface layer:
0 to 8 inches—dark grayish brown loam

Subsoil:
8 to 15 inches—dark grayish brown loam
15 to 19 inches—multicolored, calcareous gravelly sand

Underlying layer:
19 to 60 inches—multicolored, calcareous gravelly sand

Enet

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 25 inches—dark grayish brown loam

Underlying layer:
25 to 40 inches—brown, calcareous very gravelly loamy sand
40 to 60 inches—pale brown, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Delmont—somewhat excessively drained; Enet—well drained
Depth class: Very deep
Depth to a contrasting or impervious layer: Delmont—14 to 20 inches; Enet—20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderate in the upper part and rapid in the gravelly underlying material
Available water capacity: Delmont—low; Enet—moderate
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Henkin soils, which do not have gravelly underlying material and are in landscape positions similar to those of the Delmont and Enet soils

Similar inclusions:
• Soils that have gravelly sand at a depth of less than 14 inches
• Soils that have more sand in the subsoil than the Enet soil

Use and Management

Cropland and pasture

Main crops: Small grain and corn
Suitable pasture plants: Alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass
Management concerns: The low or moderate available water capacity
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.

Interpretive Groups

Land capability classification: Delmont—IVs-1; Enet—IIIs-2

Range site: Delmont—Shallow to Gravel; Enet—Silty
Windbreak suitability group: 6

DkD—Delmont-Ethan loams, 9 to 20 percent slopes

Composition

Delmont soil and similar inclusions: 50 to 60 percent
Ethan soil and similar inclusions: 20 to 40 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Moraines
Landform position: Delmont—back slopes; Ethan—shoulder slopes
Slope range: Delmont—9 to 15 percent; Ethan—9 to 20 percent
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Delmont

Surface layer:
0 to 8 inches—grayish brown loam
Subsoil:
8 to 15 inches—dark grayish brown loam
15 to 19 inches—multicolored, calcareous gravelly sand
Underlying layer:
19 to 60 inches—multicolored, calcareous gravelly sand

Ethan

Surface layer:
0 to 8 inches—grayish brown, calcareous loam
Subsoil:
8 to 22 inches—pale brown, calcareous loam
22 to 37 inches—light gray, mottled, calcareous loam
Underlying layer:
37 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Delmont—somewhat excessively drained; Ethan—well drained
Depth class: Very deep
Depth to a contrasting or impervious layer: Delmont—14 to 20 inches
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Delmont—moderate in the upper part and rapid in the gravelly underlying material; Ethan—moderately slow
Available water capacity: Delmont—low; Ethan—high
Organic matter content: Delmont—moderate; Ethan—low
Surface runoff: Rapid

Inclusions

Contrasting inclusions:
• Canning soils, which are more than 20 inches deep to gravelly material and are in the lower areas
Similar inclusions:
• Delmont soils that have gravelly sand at a depth of less than 14 inches
• Ethan soils that have a dark surface layer less than 7 inches thick

Use and Management

Cropland and pasture

General management considerations:
• The soils are unsuited to cropland; most of the acreage supports native grasses and is grazed or used for hay.
Suitable pasture plants: Alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass
Management concerns: Water erosion, the low available water capacity in the Delmont soil
Management measures:
• Cross-fencing and timely deferment of grazing or rotation grazing help to control erosion.

Interpretive Groups

Land capability classification: Delmont—VIe-5; Ethan—VIe-3
Range site: Delmont—Shallow to Gravel; Ethan—Silty
Windbreak suitability group: 10

DmD—Delmont-Talmo loams, 9 to 20 percent slopes

Composition

Delmont soil and similar inclusions: 40 to 50 percent
Talmo soil and similar inclusions: 35 to 45 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Moraines
Landform position: Delmont—back slopes; Talmo—shoulder slopes
Slope range: Delmont—9 to 15 percent; Talmo—9 to 20 percent
Shape of areas: Irregular
Size of areas: 5 to 150 acres

Typical Profile

Delmont

Surface layer:
0 to 8 inches—dark grayish brown loam

Subsoil:
8 to 15 inches—dark grayish brown loam
15 to 19 inches—multicolored, calcareous gravelly sand

Underlying layer:
19 to 60 inches—multicolored, calcareous gravelly sand

Talmo

Surface layer:
0 to 7 inches—very dark grayish brown loam

Underlying layer:
7 to 16 inches—multicolored very gravelly loamy sand
16 to 60 inches—multicolored, calcareous very gravelly sand

Soil Properties and Qualities

Drainage class: Delmont—somewhat excessively drained; Talmo—excessively drained
Depth class: Very deep
Depth to a contrasting or impervious layer: Delmont—14 to 20 inches; Talmo—14 inches or less
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Delmont—moderate in the upper part and rapid in the gravelly underlying material; Talmo—rapid
Available water capacity: Low
Organic matter content: Moderate
Surface runoff: Delmont—medium; Talmo—slow

Inclusions

Contrasting inclusions:
• Canning soils, which are more than 20 inches deep to gravelly material and are on the lower back slopes
• Ethan soils, which do not have gravelly material within a depth of 40 inches and are on shoulder slopes

Use and Management

Cropland and pasture

General management considerations:
• The soils are unsuited to cropland; most of the acreage supports native grasses and is grazed or used for hay.
Suitable pasture plants: Alfalfa and crested wheatgrass in areas of the Delmont soil
Management concerns: Water erosion, the low available water capacity
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: Delmont—VIe-5; Talmo—VIs-4
Range site: Delmont—Shallow to Gravel; Talmo—Very Shallow to Gravel
Windbreak suitability group: 10

DpA—Dudley-Jerauld complex, 0 to 3 percent slopes

Composition

Dudley soil and similar inclusions: 35 to 55 percent
Jerauld soil and similar inclusions: 30 to 50 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Dudley—back slopes; Jerauld—foot slopes
Slope range: 0 to 3 percent
Shape of areas: Irregular
Size of areas: 5 to 50 acres

Typical Profile

Dudley

Surface layer:
0 to 4 inches—dark gray silt loam
4 to 6 inches—grayish brown silt loam

Subsoil:
6 to 21 inches—grayish brown and dark grayish brown clay loam
21 to 45 inches—light brownish gray and pale olive, calcareous clay loam that has accumulations of salts

Underlying layer:
45 to 60 inches—pale olive, calcareous clay loam

Jerauld

Surface layer:
0 to 3 inches—gray loam

Subsoil:
3 to 9 inches—dark gray and dark grayish brown clay
9 to 17 inches—dark grayish brown clay that has accumulations of salts
17 to 21 inches—grayish brown, calcareous clay loam that has accumulations of salts
21 to 41 inches—light brownish gray, calcareous clay loam that has accumulations of salts

Underlying layer:
41 to 60 inches—light brownish gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth class: Very deep

Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Slow
Available water capacity: Dudley—moderate; Jerauld—low or moderate
Organic matter content: Dudley—moderate; Jerauld—low
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The well drained Beadle and Houdek soils, which do not have a sodium-affected subsoil and are in the slightly higher areas
• The somewhat poorly drained Crossplain soils, which do not have a sodium-affected subsoil and are on toe slopes
• The moderately well drained Onita soils, which do not have a sodium-affected subsoil and are on foot slopes
• The poorly drained Plankinton soils in basins

Use and Management

Cropland and pasture

General management considerations:
• Crop growth is severely restricted in areas of the Jerauld soil.
Main crops: Alfalfa, small grain, and sorghum in areas of the Dudley soil
Suitable pasture plants: Alfalfa and intermediate wheatgrass in areas of the Dudley soil
Management concerns: A sodium-affected subsoil that adversely affects crop growth by restricting root penetration and the rate of water intake, compaction during wet periods, tilth maintenance
Management measures:
• Minimizing tillage, leaving crop residue on the surface, applying animal manure, including grasses and legumes in the cropping system, and chiseling and subsoiling improve tilth and increase the rate of water intake.

Interpretive Groups

Land capability classification: Dudley—IVs-2; Jerauld—VIs-1
Range site: Dudley—Claypan; Jerauld—Thin Claypan
Windbreak suitability group: Dudley—9; Jerauld—10

Du—Durrstein silt loam

Composition

Durrstein soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Flood plains
Landform position: Low flood plains
Shape of areas: Long and narrow
Size of areas: 10 to more than 200 acres

Typical Profile

Surface layer:
0 to 1 inch—gray silt loam
Subsoil:
1 to 9 inches—very dark gray silty clay
9 to 32 inches—very dark gray, calcareous silty clay that has accumulations of salts
Underlying layer:
32 to 60 inches—gray, light olive gray, and olive gray, mottled, calcareous silty clay loam that has accumulations of salts

Soil Properties and Qualities

Drainage class: Poorly drained
Depth class: Very deep
Depth to the seasonal high water table: 0 to 1.5 feet
Flooding: Frequency—occasional; duration—brief
Permeability: Slow
Available water capacity: Moderate
Organic matter content: Low
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The moderately well drained Artesian soils, which do not have a sodium-affected subsoil and are on slight rises
• Baltic soils, which do not have a sodium-affected subsoil and are in landscape positions similar to those of the Durrstein soil
• Bon soils, which do not have a sodium-affected subsoil and are in the slightly higher areas
• The saline Egas soils, which do not have a sodium-affected subsoil and are in landscape positions similar to those of the Durrstein soil

Use and Management

Cropland and pasture

General management considerations:
• The soil generally is too wet and too saline for cultivated crops; most areas support native grasses and are grazed or used for hay.
Suitable pasture plants: Tall wheatgrass and western wheatgrass
Management concerns: A sodium-affected subsoil that severely limits productivity, compaction during wet periods
Management measures:
• Restricted grazing during wet periods helps to prevent surface compaction and the deterioration of tilth.

Interpretive Groups

Land capability classification: VIw-4
Range site: Saline Lowland
Windbreak suitability group: 10

Dx—Durrstein-Egas complex

Composition

Durrstein soil and similar inclusions: 55 to 65 percent
Egas soil and similar inclusions: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Flood plains
Landform position: Low flood plains
Slope range: 0 to 1 percent
Shape of areas: Irregular
Size of areas: 50 to more than 100 acres

Typical Profile

Durrstein

Surface layer:
0 to 1 inch—gray silt loam

Subsoil:
1 to 9 inches—very dark gray silty clay
9 to 32 inches—very dark gray, calcareous silty clay that has accumulations of salts

Underlying layer:
32 to 60 inches—gray, light olive gray, and olive gray, mottled, calcareous silty clay loam that has accumulations of salts

Egas

Surface soil:
0 to 17 inches—dark gray silty clay that has accumulations of salts and is calcareous below a depth of 6 inches

Subsoil:
17 to 34 inches—gray, calcareous silty clay that has accumulations of salts

Underlying layer:
34 to 60 inches—light olive gray and olive gray, calcareous silty clay

Soil Properties and Qualities

Drainage class: Poorly drained
Depth class: Very deep
Depth to the seasonal high water table: Durrstein—0 to 1.5 feet; Egas—0 to 1.0 foot
Flooding: Frequency—occasional; duration—brief
Permeability: Slow
Available water capacity: Moderate
Organic matter content: Durrstein—low; Egas—moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The moderately well drained Artesian and well drained Bon soils, which do not have a sodium-affected subsoil and are in the slightly higher areas
• The somewhat poorly drained Farmsworth soils on slight rises

Use and Management

Cropland and pasture

General management considerations:
• The soils are unsuited to cropland; most areas support native grasses and are grazed or used for hay.
Suitable pasture plants: Tall wheatgrass and western wheatgrass in areas of the Durrstein soil
Management concerns: Wetness, salinity, the slow rate of water intake, poor tilth
Management measures:
• Restricted grazing during wet periods helps to prevent surface compaction and the deterioration of tilth.

Interpretive Groups

Land capability classification: Durrstein—VIw-4; Egas—VIw-5
Range site: Saline Lowland
Windbreak suitability group: 10

Dz—Durrstein Variant-Artesian complex

Composition

Durrstein Variant soil and similar inclusions: 50 to 60 percent
Artesian soil and similar inclusions: 30 to 40 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Fans
Landform position: Durrstein Variant—lower foot slopes; Artesian—foot slopes
Slope range: Durrstein Variant—0 to 1 percent; Artesian—0 to 2 percent
Shape of areas: Irregular
Size of areas: 30 to more than 100 acres

Typical Profile

Durrstein Variant

Surface layer:
0 to 3 inches—gray silt loam

Subsoil:
3 to 5 inches—very dark gray clay

5 to 13 inches—very dark gray, calcareous clay
13 to 21 inches—very dark gray, calcareous clay that has accumulations of salts
21 to 36 inches—dark gray, calcareous clay that has accumulations of salts

Underlying layer:
36 to 60 inches—light brownish gray, calcareous clay loam

Artesian

Surface layer:
0 to 7 inches—dark gray, calcareous silty clay

Subsoil:
7 to 17 inches—dark gray, calcareous clay
17 to 26 inches—grayish brown, calcareous clay that has accumulations of gypsum

Underlying layer:
26 to 60 inches—grayish brown and light brownish gray, calcareous clay that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Durrstein Variant—somewhat poorly drained; Artesian—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: 3 to 6 feet
Flooding: Rare
Permeability: Slow
Available water capacity: Durrstein Variant—moderate; Artesian—moderate or high
Organic matter content: Durrstein Variant—low; Artesian—moderate or high
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Farmsworth soils, which do not have visible salts within a depth of 16 inches and occur near the outer edges of the mapped areas

Similar inclusions:
• Artesian soils that have a surface layer of silty clay loam

Use and Management

Cropland and pasture

General management considerations:
• Most of the acreage supports native grasses and is grazed or used for hay.
Management concerns: A sodium-affected subsoil in the Durrstein Variant soil that severely limits productivity, compaction caused by grazing animals during wet periods
Management measures:
• Restricting grazing during wet periods helps to prevent surface compaction and the deterioration of tilth.

Interpretive Groups

Land capability classification: Durrstein Variant—VIs-1; Artesian—IIw-2
Range site: Durrstein Variant—Thin Claypan; Artesian—Subirrigated
Windbreak suitability group: Durrstein Variant—10; Artesian—1

EaB—Eakin-Ethan-Onita complex, 2 to 6 percent slopes

Composition

Eakin soil and similar inclusions: 40 to 50 percent
Ethan soil and similar inclusions: 15 to 35 percent
Onita soil and similar inclusions: 15 to 25 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Eakin—back slopes; Ethan—shoulder slopes; Onita—foot slopes
Slope range: Eakin and Ethan—2 to 6 percent; Onita—2 to 3 percent
Shape of areas: Irregular
Size of areas: 15 to 1,000 acres

Typical Profile

Eakin

Surface layer:
0 to 7 inches—dark grayish brown silt loam

Subsoil:
7 to 15 inches—dark grayish brown silty clay loam
15 to 21 inches—light brownish gray, calcareous silty clay loam
21 to 39 inches—light brownish gray, mottled, calcareous silty clay loam

Underlying layer:
39 to 60 inches—light brownish gray, mottled clay loam

Ethan

Surface layer:
0 to 8 inches—grayish brown, calcareous loam

Subsoil:
8 to 22 inches—pale brown, calcareous loam
22 to 37 inches—light gray, mottled, calcareous loam

Underlying layer:
37 to 60 inches—light gray, mottled, calcareous loam

Onita

Surface soil:
0 to 17 inches—dark gray and dark grayish brown silt loam

Subsoil:
17 to 29 inches—dark gray silty clay
29 to 40 inches—dark gray, calcareous silty clay
40 to 50 inches—grayish brown, mottled, calcareous silty clay loam
50 to 60 inches—light brownish gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Eakin and Ethan—well drained; Onita—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Eakin and Ethan—more than 6.0 feet; Onita—2.5 to 6.0 feet
Flooding on the Eakin and Ethan soils: None
Flooding on the Onita soil: Frequency—occasional; duration—brief
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Eakin—moderate; Ethan—low; Onita—high
Surface runoff: Medium

Inclusions

Contrasting inclusions:
• Beadle soils, which have more clay than the Eakin soil and are in similar landscape positions
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Soils that have less sand and more silt in the subsoil and underlying material than the Ethan soil
• Soils that have less clay in the subsoil than the Onita soil

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Water erosion, a high content of lime in the Ethan soil that adversely affects the availability of plant nutrients
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility.
• Contour farming, grassed waterways, and terraces help to control erosion, but some slopes are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: Eakin—IIe-2; Ethan—IIIe-12; Onita—IIc-3
Range site: Eakin and Ethan—Silty; Onita—Overflow
Windbreak suitability group: Eakin—3; Ethan—8; Onita—1

EnA—Enet loam, 0 to 2 percent slopes

Composition

Enet soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Outwash plains
Landform position: Summits and back slopes
Shape of areas: Irregular
Size of areas: 5 to 130 acres

Typical Profile

Surface layer:
0 to 7 inches—dark grayish brown loam
Subsoil:
7 to 25 inches—dark grayish brown loam
Underlying layer:
25 to 40 inches—brown, calcareous very gravelly loamy sand
40 to 60 inches—pale brown, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to a contrasting or impervious layer: 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderate in the upper part and rapid in the underlying material
Available water capacity: Moderate
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Delmont soils, which have gravelly sand at a depth of 14 to 20 inches and are on summits and shoulder slopes
• The poorly drained Plankinton and Tetonka soils in basins
• Soils that have more sand in the subsoil than the Enet soil

Use and Management

Cropland and pasture

General management considerations:
• Because this soil is somewhat droughty, it is better suited to small grain than to late-maturing crops.

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass
Management concerns: The moderate available water capacity
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture.

Interpretive Groups

Land capability classification: IIIs-2
Range site: Silty
Windbreak suitability group: 6

EpB—Enet-Delmont loams, 2 to 6 percent slopes

Composition

Enet soil and similar inclusions: 45 to 65 percent
Delmont soil and similar inclusions: 25 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Outwash plains
Landform position: Enet—back slopes and upper foot slopes; Delmont—shoulder slopes and upper back slopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 10 to more than 200 acres

Typical Profile

Enet

Surface layer:
0 to 7 inches—dark grayish brown loam
Subsoil:
7 to 25 inches—dark grayish brown loam
Underlying layer:
25 to 40 inches—brown, calcareous very gravelly loamy sand
40 to 60 inches—pale brown, calcareous gravelly sand

Delmont

Surface layer:
0 to 8 inches—dark grayish brown loam
Subsoil:
8 to 15 inches—dark grayish brown loam
15 to 19 inches—multicolored, calcareous gravelly sand
Underlying layer:
19 to 60 inches—multicolored, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Enet—well drained; Delmont—somewhat excessively drained
Depth class: Very deep
Depth to a contrasting or impervious layer: Enet—20 to 40 inches; Delmont—14 to 20 inches
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderate in the upper part and rapid in the gravelly underlying material
Available water capacity: Enet—moderate; Delmont—low
Organic matter content: Moderate
Surface runoff: Medium

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Crossplain soils on toe slopes
• The poorly drained Plankinton and Tetonka soils in basins
Similar inclusions:
• Enet soils that are not dark below a depth of 20 inches or that have a subsoil of sandy loam
• Delmont soils that have gravelly sand at a depth of less than 14 inches

Use and Management

Cropland and pasture

General management considerations:
• Unless irrigated, these soils are better suited to small grain than to late-maturing crops, such as corn.
Suitable pasture plants: Alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass
Management concerns: Erosion, the low or moderate available water capacity
Management measures:
• Leaving crop residue on the surface and minimizing tillage help to control erosion and conserve moisture.

Interpretive Groups

Land capability classification: Enet—IIIe-6; Delmont—IVe-6
Range site: Enet—Silty; Delmont—Shallow to Gravel
Windbreak suitability group: 6

EtD—Ethan-Betts loams, 9 to 20 percent slopes

Composition

Ethan soil and similar inclusions: 45 to 55 percent

Betts soil and similar inclusions: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Ethan—back slopes; Betts—shoulder slopes
Slope range: 9 to 20 percent
Shape of areas: Irregular
Size of areas: 10 to more than 200 acres

Typical Profile

Ethan

Surface layer:
0 to 8 inches—grayish brown, calcareous loam

Subsoil:
8 to 22 inches—pale brown, calcareous loam
22 to 37 inches—light gray, mottled, calcareous loam

Underlying layer:
37 to 60 inches—light gray, mottled, calcareous loam

Betts

Surface layer:
0 to 2 inches—gray, calcareous loam

Subsoil:
2 to 6 inches—grayish brown, calcareous loam
6 to 22 inches—grayish brown, mottled, calcareous loam

Underlying layer:
22 to 60 inches—light brownish gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Low
Surface runoff: Medium

Inclusions

Contrasting inclusions:
• The moderately well drained Bon soils on high flood plains
• The moderately well drained Davis soils on the lower foot slopes
• The clayey Peno soils in landscape positions similar to those of the Ethan soil
• Talmo soils, which have gravelly sand within a depth of 14 inches and are on shoulder slopes

Similar inclusions:
• Soils that have more clay in the surface layer and subsoil than the Betts soil

Use and Management

Cropland and pasture

General management considerations:
• The soils are unsuited to cropland; most of the acreage supports native grasses and is grazed.
Suitable pasture plants: Alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass
Management concerns: Water erosion if an adequate plant cover is not maintained
Management measures:
• Cross-fencing and timely deferment of grazing or rotation grazing help to control erosion.

Interpretive Groups

Land capability classification: VIe-3
Range site: Ethan—Silty; Betts—Thin Upland
Windbreak suitability group: 10

Fa—Farmsworth-Artesian complex

Composition

Farmsworth soil and similar inclusions: 50 to 60 percent
Artesian soil and similar inclusions: 40 to 50 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Fans
Landform position: Farmsworth—lower foot slopes; Artesian—upper foot slopes
Slope range: Farmsworth—0 to 1 percent; Artesian—0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to 200 acres

Typical Profile

Farmsworth

Surface layer:
0 to 8 inches—dark gray silt loam
8 to 10 inches—gray silt loam

Subsoil:
10 to 17 inches—dark gray clay
17 to 25 inches—dark grayish brown silty clay that has accumulations of gypsum and other salts
25 to 33 inches—grayish brown clay loam that has accumulations of gypsum and other salts
33 to 50 inches—grayish brown, mottled, calcareous clay loam that has accumulations of gypsum and other salts

Underlying layer:
50 to 60 inches—light brownish gray, mottled, calcareous clay loam

Artesian

Surface layer:
0 to 7 inches—dark gray, calcareous silty clay

Subsoil:
7 to 17 inches—dark gray, calcareous clay
17 to 26 inches—grayish brown, calcareous clay that has accumulations of gypsum

Underlying layer:
26 to 60 inches—grayish brown and light brownish gray, calcareous clay that has accumulations of gypsum

Soil Properties and Qualities

Drainage class: Farmsworth—somewhat poorly drained; Artesian—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: 3 to 6 feet
Flooding: Rare
Permeability: Slow
Available water capacity: Moderate or high
Organic matter content: Farmsworth—moderate; Artesian—moderate or high
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Durrstein soils, which have visible salts within a depth of 16 inches and are on the lower foot slopes

Similar inclusions:
• Artesian soils that have a surface layer of silty clay loam

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa and intermediate wheatgrass
Management concerns: Compaction during wet periods, a sodium-affected subsoil in the Farmsworth soil that adversely affects crop growth by restricting root penetration and the rate of water intake
Management measures:
• Minimizing tillage, leaving crop residue on the surface, ensuring timely tillage, chiseling and subsoiling, and including grasses and legumes in the crop rotation improve tilth and increase the rate of water intake.

Interpretive Groups

Land capability classification: Farmsworth—IVs-2; Artesian—IIw-2
Range site: Farmsworth—Claypan; Artesian—Subirrigated
Windbreak suitability group: Farmsworth—9; Artesian—1

Fd—Farmsworth-Lane complex

Composition

Farmsworth soil and similar inclusions: 45 to 55 percent
Lane soil and similar inclusions: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Fans
Landform position: Farmsworth—lower foot slopes; Lane—foot slopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Farmsworth

Surface layer:
0 to 8 inches—dark gray silt loam
8 to 10 inches—gray silt loam

Subsoil:
10 to 17 inches—dark gray clay
17 to 25 inches—dark grayish brown silty clay that has accumulations of gypsum and other salts
25 to 33 inches—grayish brown clay loam that has accumulations of gypsum and other salts
33 to 50 inches—grayish brown, mottled, calcareous clay loam that has accumulations of gypsum and other salts

Underlying layer:
50 to 60 inches—light brownish gray, mottled, calcareous clay loam

Lane

Surface layer:
0 to 8 inches—dark gray silty clay loam

Subsoil:
8 to 22 inches—dark gray silty clay
22 to 30 inches—dark gray, calcareous silty clay
30 to 50 inches—grayish brown, calcareous silty clay

Underlying layer:
50 to 60 inches—grayish brown, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Farmsworth—somewhat poorly drained; Lane—moderately well drained
Depth class: Very deep

Depth to the seasonal high water table: Farmsworth—3 to 6 feet; Lane—more than 6 feet
Flooding: Rare
Permeability: Slow
Available water capacity: Moderate or high
Organic matter content: Farmsworth—moderate; Lane—high
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Bon soils, which do not have a sodium-affected subsoil, have less clay than the Lane soil, and are in landscape positions similar to those of the Lane soil
• Durrstein soils, which have salts within a depth of 16 inches and are on low flood plains
• The poorly drained Egas soils, which do not have a sodium-affected subsoil and are on low flood plains
• The well drained Ree soils on outwash plains

Similar inclusions:
• In places, Lane soils that have a seasonal high water table at a depth of 3 to 6 feet

Use and Management

Cropland and pasture

General management considerations:
• These soils are better suited to early maturing small grain than to corn.
Suitable pasture plants: Alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and western wheatgrass
Management concerns: Compaction during wet periods, a sodium-affected subsoil in the Farmsworth soil that adversely affects crop growth by restricting root penetration and the rate of water intake
Management measures:
• Minimizing tillage, leaving crop residue on the surface, ensuring timely tillage, chiseling and subsoiling, and including grasses and legumes in the crop rotation improve tilth and increase the rate of water intake.

Interpretive Groups

Land capability classification: Farmsworth—IVs-2; Lane—IIs-1
Range site: Farmsworth—Claypan; Lane—Clayey
Windbreak suitability group: Farmsworth—9; Lane—3

Fe—Fedora loam

Composition

Fedora soil and similar inclusions: 80 to 99 percent
Contrasting inclusions: 1 to 20 percent

Setting

Landform: Outwash plains
Landform position: Foot slopes
Shape of areas: Long and narrow
Size of areas: 10 to more than 100 acres

Typical Profile

Surface soil:
0 to 11 inches—dark gray and gray loam that is calcareous below a depth of 2 inches

Subsoil:
11 to 14 inches—gray, calcareous loam
14 to 25 inches—light gray, calcareous sandy loam

Underlying layer:
25 to 36 inches—light brownish gray, mottled, calcareous fine sandy loam
36 to 60 inches—light brownish gray, mottled, calcareous loamy fine sand

Soil Properties and Qualities

Drainage class: Poorly drained
Depth class: Very deep
Depth to the seasonal high water table: 1 to 4 feet
Flooding: None
Permeability: Moderately rapid
Available water capacity: Moderate
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The well drained Bon and Enet soils in the slightly higher areas
• Lawet soils, which have more clay between depths of 10 and 40 inches than the Fedora soil and are in similar landscape positions
• The clayey Lane soils that occur near the outer edges of the mapped areas
• The very poorly drained Worthing soils in basins

Use and Management

Cropland and pasture

General management considerations:
• Most of the acreage supports native grasses and is grazed or used for hay.
Main crops: Late-planted crops, such as corn, sorghum, and some melons and pumpkins
Suitable pasture plants: Alfalfa, Garrison creeping foxtail, smooth bromegrass, and switchgrass
Management concerns: Wind erosion, wetness, a high content of lime that adversely affects the availability of plant nutrients
Management measures:
• Minimizing tillage, leaving crop residue on the surface,

stripcropping, and establishing field windbreaks help to control erosion and improve fertility.

Interpretive Groups

Land capability classification: IIIw-5
Range site: Subirrigated
Windbreak suitability group: 2

GpD—Gettys-Peno complex, 9 to 20 percent slopes

Composition

Gettys soil and similar inclusions: 50 to 60 percent
Peno soil and similar inclusions: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Gettys—shoulder slopes and upper back slopes; Peno—back slopes
Slope range: Gettys—9 to 20 percent; Peno—9 to 15 percent
Shape of areas: Irregular
Size of areas: 15 to 200 acres

Typical Profile

Gettys

Surface layer:
0 to 4 inches—dark gray clay loam

Subsoil:
4 to 18 inches—grayish brown, mottled, calcareous clay loam
18 to 28 inches—pale brown, mottled, calcareous clay loam

Underlying layer:
28 to 34 inches—light brownish gray, mottled, calcareous clay loam
34 to 60 inches—grayish brown and light brownish gray, mottled, calcareous clay loam

Peno

Surface layer:
0 to 3 inches—very dark gray clay loam

Subsoil:
3 to 10 inches—very dark gray clay loam
10 to 17 inches—gray, calcareous clay loam
17 to 46 inches—light brownish gray, mottled, calcareous clay loam

Underlying layer:
46 to 60 inches—grayish brown, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: Gettys—moderate or high; Peno—high
Organic matter content: Gettys—low; Peno—moderate
Surface runoff: Gettys—rapid; Peno—medium

Inclusions

Contrasting inclusions:
• Ethan soils, which have less clay than the Peno soil and are in similar landscape positions
• The moderately well drained Onita soils on foot slopes

Similar inclusions:
• Soils that have less clay than the Gettys soil

Use and Management

Cropland and pasture

General management considerations:
• Most areas support native grasses and are grazed or used for hay.
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Water erosion
Management measures:
• Cross-fencing and timely deferment of grazing or rotation grazing help to control erosion.
• Cultivated areas should be seeded to adapted grasses.

Interpretive Groups

Land capability classification: VIe-3
Range site: Gettys—Thin Upland; Peno—Clayey
Windbreak suitability group: 10

HaB—Hand-Ethan-Prosper loams, 1 to 5 percent slopes

Composition

Hand soil and similar inclusions: 40 to 60 percent
Ethan soil and similar inclusions: 20 to 30 percent
Prosper soil and similar inclusions: 10 to 20 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Hand—summits and back slopes; Ethan—shoulder slopes; Prosper—foot slopes
Slope range: Hand and Ethan—2 to 5 percent; Prosper—1 to 2 percent

Shape of areas: Irregular
Size of areas: 20 to more than 200 acres

Typical Profile

Hand

Surface layer:
0 to 9 inches—dark grayish brown loam

Subsoil:
9 to 15 inches—dark grayish brown loam
15 to 31 inches—light gray and very pale brown, calcareous loam

Underlying layer:
31 to 44 inches—light gray, mottled, calcareous silt loam
44 to 60 inches—light gray, mottled, calcareous loam

Ethan

Surface layer:
0 to 8 inches—grayish brown, calcareous loam

Subsoil:
8 to 22 inches—pale brown, calcareous loam
22 to 37 inches—light gray, mottled, calcareous loam

Underlying layer:
37 to 60 inches—light gray, mottled, calcareous loam

Prosper

Surface layer:
0 to 10 inches—dark grayish brown loam

Subsoil:
10 to 23 inches—dark grayish brown clay loam
23 to 27 inches—brown, calcareous clay loam
27 to 41 inches—light yellowish brown, calcareous loam

Underlying layer:
41 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Hand and Ethan—well drained; Prosper—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Hand and Ethan—more than 6 feet; Prosper—3 to 6 feet
Flooding: None
Permeability: Hand—moderate; Ethan and Prosper—moderately slow
Available water capacity: High
Organic matter content: Hand—moderate; Ethan—low; Prosper—high
Surface runoff: Hand and Ethan—medium; Prosper—slow

Inclusions

Contrasting inclusions:
• Henkin soils, which have more sand than the Hand soil and are in similar landscape positions
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Hand soils that have loam or clay loam glacial till in the underlying material
• Ethan soils in which the subsoil and underlying material are stratified
• Prosper soils that have a subsoil that is loam throughout

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Water erosion, a high content of lime in the Ethan soil that adversely affects the availability of plant nutrients
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility.
• Contour farming, grassed waterways, and terraces help to control erosion, but slopes in most areas are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: Hand—IIe-2; Ethan—IIIe-12; Prosper—IIc-3
Range site: Hand and Ethan—Silty; Prosper—Overflow
Windbreak suitability group: Hand—3; Ethan—8; Prosper—1

HaC—Hand-Ethan-Prosper loams, 2 to 9 percent slopes

Composition

Hand soil and similar inclusions: 35 to 40 percent
Ethan soil and similar inclusions: 20 to 40 percent
Prosper soil and similar inclusions: 15 to 25 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Hand—summits and back slopes; Ethan—shoulder slopes; Prosper—foot slopes
Slope range: Hand—3 to 9 percent; Ethan—5 to 9 percent; Prosper—2 to 3 percent
Shape of areas: Irregular
Size of areas: 25 to 150 acres

Typical Profile

Hand

Surface layer:
0 to 9 inches—dark grayish brown loam

Subsoil:
9 to 15 inches—dark grayish brown loam
15 to 31 inches—light gray and very pale brown, calcareous loam

Underlying layer:
31 to 44 inches—light gray, mottled, calcareous silt loam
44 to 60 inches—light gray, mottled, calcareous loam

Ethan

Surface layer:
0 to 8 inches—grayish brown, calcareous loam

Subsoil:
8 to 22 inches—pale brown, calcareous loam
22 to 37 inches—light gray, mottled, calcareous loam

Underlying layer:
37 to 60 inches—light gray, mottled, calcareous loam

Prosper

Surface layer:
0 to 10 inches—dark grayish brown loam

Subsoil:
10 to 23 inches—dark grayish brown clay loam
23 to 27 inches—brown, calcareous clay loam
27 to 41 inches—light yellowish brown, calcareous loam

Underlying layer:
41 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Hand and Ethan—well drained; Prosper—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Hand and Ethan—more than 6 feet; Prosper—3 to 6 feet
Flooding: None
Permeability: Hand—moderate; Ethan and Prosper—moderately slow
Available water capacity: High
Organic matter content: Hand—moderate; Ethan—low; Prosper—high
Surface runoff: Hand and Ethan—medium; Prosper—slow

Inclusions

Contrasting inclusions:
• Henkin soils, which have more sand than the Hand soil and are in similar landscape positions
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Hand soils that have loam or clay loam glacial till in the underlying material
• Ethan soils in which the subsoil and underlying material are stratified
• Prosper soils that have a subsoil that is loam throughout

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Water erosion, a high content of lime in the Ethan soil that adversely affects the availability of plant nutrients
Management measures:
• Minimizing tillage, leaving crop residue on the surface, planting close-growing crops, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility.
• Terraces, contour farming, and grassed waterways help to control erosion, but slopes in most areas are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: Hand—IIIe-2; Ethan—IVe-3; Prosper—IIc-3
Range site: Hand and Ethan—Silty; Prosper—Overflow
Windbreak suitability group: Hand—3; Ethan—8; Prosper—1

HcA—Hand-Prosper loams, 0 to 3 percent slopes

Composition

Hand soil and similar inclusions: 50 to 60 percent
Prosper soil and similar inclusions: 20 to 30 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Hand—summits and back slopes; Prosper—foot slopes
Slope range: Hand—0 to 3 percent; Prosper—0 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to more than 100 acres

Typical Profile

Hand

Surface layer:
0 to 9 inches—dark grayish brown loam

Subsoil:
9 to 15 inches—dark grayish brown loam
15 to 31 inches—light gray and very pale brown, calcareous loam

Underlying layer:
31 to 44 inches—light gray, mottled, calcareous silt loam
44 to 60 inches—light gray, mottled, calcareous loam

Prosper

Surface layer:
0 to 10 inches—dark grayish brown loam

Subsoil:
10 to 23 inches—dark grayish brown clay loam
23 to 27 inches—brown, calcareous clay loam
27 to 41 inches—light yellowish brown, calcareous loam

Underlying layer:
41 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Hand—well drained; Prosper—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Hand—more than 6 feet; Prosper—3 to 6 feet
Flooding: None
Permeability: Hand—moderate; Prosper—moderately slow
Available water capacity: High
Organic matter content: Hand—moderate; Prosper—high
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The sodium-affected Dudley soils on foot slopes
• Ethan soils, which have lime at or near the surface and are on shoulder slopes
• Henkin soils, which have more sand than the Hand soil and are in similar landscape positions
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Hand soils that have underlying material that is loam or clay loam glacial till
• Prosper soils that have a subsoil that is loam throughout

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Conserving moisture

Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture.

Interpretive Groups

Land capability classification: Hand—IIc-2; Prosper—IIc-3
Range site: Hand—Silty; Prosper—Overflow
Windbreak suitability group: Hand—3; Prosper—1

HeB—Henkin loam, 1 to 5 percent slopes

Composition

Henkin soil and similar inclusions: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landform: Outwash plains
Landform position: Summits and back slopes
Shape of areas: Oblong or irregular
Size of areas: 10 to 75 acres

Typical Profile

Surface layer:
0 to 12 inches—very dark grayish brown and dark grayish brown loam

Subsoil:
12 to 36 inches—grayish brown and brown sandy loam
36 to 43 inches—brown loam
43 to 60 inches—grayish brown, calcareous sandy loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderately rapid
Available water capacity: Moderate
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Bon soils, which have more clay than the Henkin soil and are in the lower areas
• Henkin Variant soils, which have more sand than the Henkin soil and are on the steeper slopes
• Hand soils, which have more clay than the Henkin soil and are in similar landscape positions

Similar inclusions:
• Soils that are dark below a depth of 20 inches
• Soils that have gravelly material at a depth of 30 to 60 inches

Use and Management

Cropland and pasture

General management considerations:
• Most of the acreage supports native grasses and is grazed or used for hay.
Main crops: Small grain and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, sand bluestem, and smooth bromegrass
Management concerns: Wind erosion, the moderate available water capacity
Management measures:
• Minimizing tillage and leaving crop residue on the surface help to control erosion and conserve moisture.

Interpretive Groups

Land capability classification: IIIe-8
Range site: Sandy
Windbreak suitability group: 5

HfD—Henkin Variant sandy loam, 6 to 40 percent slopes

Composition

Henkin Variant soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Outwash plains
Landform position: Shoulder slopes and back slopes
Shape of areas: Long and narrow or irregular
Size of areas: 10 to 70 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown sandy loam
Transitional layer:
10 to 20 inches—brown loamy sand
Underlying layer:
20 to 60 inches—pale brown loamy sand

Soil Properties and Qualities

Drainage class: Excessively drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Rapid
Available water capacity: Low
Organic matter content: Low
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Betts and Ethan soils, which formed in loamy glacial till and are in landscape positions similar to those of the Henkin Variant soil
• Henkin soils, which have more clay and less sand than the Henkin Variant soil and are on the lower back slopes
Similar inclusions:
• Soils that are dark to a depth of less than 10 inches

Use and Management

Cropland and pasture

General management considerations:
• The soil is unsuited to cropland; almost all of the acreage supports native grasses and is grazed or used for hay.
Suitable pasture plants: Alfalfa, intermediate wheatgrass, sand bluestem, and smooth bromegrass
Management concerns: Water erosion, wind erosion, the low available water capacity
Management measures:
• Proper grazing management helps to maintain plant vigor, conserve moisture, and control erosion.

Interpretive Groups

Land capability classification: VIe-6
Range site: Sandy
Windbreak suitability group: 10

HhA—Highmore-Onita silt loams, 0 to 3 percent slopes

Composition

Highmore soil and similar inclusions: 45 to 65 percent
Onita soil and similar inclusions: 20 to 40 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Highmore—summits and back slopes; Onita—foot slopes and toe slopes
Slope range: Highmore—0 to 3 percent; Onita—0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to 150 acres

Typical Profile

Highmore

Surface layer:
0 to 7 inches—dark grayish brown silt loam

Subsoil:
7 to 16 inches—brown silty clay loam
16 to 20 inches—light yellowish brown, calcareous silty clay loam
20 to 50 inches—very pale brown, calcareous silt loam
Underlying layer:
50 to 60 inches—very pale brown, mottled, calcareous silt loam

Onita

Surface soil:
0 to 17 inches—dark gray and dark grayish brown silt loam
Subsoil:
17 to 29 inches—dark gray silty clay
29 to 40 inches—dark gray, calcareous silty clay
40 to 50 inches—grayish brown, mottled, calcareous silty clay loam
50 to 60 inches—light brownish gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Highmore—well drained; Onita—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Highmore—more than 6.0 feet; Onita—2.5 to 6.0 feet
Flooding on the Highmore soil: None
Flooding on the Onita soil: Frequency—occasional; duration—brief
Permeability: Highmore—moderate; Onita—moderately slow
Available water capacity: High
Organic matter content: Highmore—moderate; Onita—high
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Beadle soils, which have more clay and sand in the subsoil than the Highmore soil and are in similar landscape positions
• Ethan soils, which have lime at or near the surface and are on shoulder slopes
• The poorly drained Plankinton and Tetonka soils in basins
Similar inclusions:
• Onita soils that have a less clayey subsoil

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Conserving moisture
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture.

Interpretive Groups

Land capability classification: Highmore—IIc-2; Onita—IIc-3
Range site: Highmore—Silty; Onita—Overflow
Windbreak suitability group: Highmore—3; Onita—1

HIA—Homme-Onita-Beadle complex, 0 to 2 percent slopes

Composition

Homme soil and similar inclusions: 50 to 60 percent
Onita soil and similar inclusions: 15 to 25 percent
Beadle soil and similar inclusions: 10 to 30 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Homme—back slopes; Onita—foot slopes; Beadle—upper back slopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to more than 200 acres

Typical Profile

Homme

Surface layer:
0 to 8 inches—dark grayish brown silty clay loam
Subsoil:
8 to 25 inches—dark brown and light olive brown silty clay loam
25 to 45 inches—pale brown, calcareous silty clay loam
Underlying layer:
45 to 60 inches—grayish brown, calcareous clay loam

Onita

Surface layer:
0 to 8 inches—dark grayish brown silt loam
Subsurface layer:
8 to 17 inches—dark gray silt loam
Subsoil:
17 to 29 inches—dark gray silty clay
29 to 40 inches—dark gray, calcareous silty clay
40 to 50 inches—grayish brown, mottled, calcareous silty clay loam
50 to 60 inches—light brownish gray, mottled, calcareous clay loam

Beadle

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 18 inches—dark grayish brown clay loam
18 to 36 inches—grayish brown, calcareous clay loam
36 to 45 inches—grayish brown, mottled, calcareous clay loam

Underlying layer:
45 to 60 inches—grayish brown, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Homme and Beadle—well drained; Onita—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Homme and Beadle—more than 6.0 feet; Onita—2.5 to 6.0 feet
Flooding on the Homme and Beadle soils: None
Flooding on the Onita soil: Frequency—occasional; duration—brief
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Homme and Beadle—moderate; Onita—high
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The sodium-affected Dudley soils on foot slopes
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Homme soils that have a surface layer of silt loam
• Beadle soils that have less clay in the upper part of the subsoil or that have lime within a depth of 12 inches

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Conserving moisture, improving tilth and increasing the rate of water intake in the Beadle soil
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system conserve moisture and help to maintain tilth.
• Chiseling and subsoiling improve tilth and increase the rate of water intake for a short period.

Interpretive Groups

Land capability classification: Homme—IIc-2; Onita—IIc-3; Beadle—IIs-1
Range site: Homme—Silty; Onita—Overflow; Beadle—Clayey
Windbreak suitability group: Homme—3; Onita—1; Beadle—4

HpB—Homme-Peno complex, 2 to 6 percent slopes

Composition

Homme soil and similar inclusions: 45 to 55 percent
Peno soil and similar inclusions: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Homme—summits and back slopes; Peno—shoulder slopes and upper back slopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 5 to more than 200 acres

Typical Profile

Homme

Surface layer:
0 to 8 inches—dark grayish brown silty clay loam

Subsoil:
8 to 25 inches—dark brown and light olive brown silty clay loam
25 to 45 inches—pale brown, calcareous silty clay loam

Underlying layer:
45 to 60 inches—grayish brown, calcareous clay loam

Peno

Surface layer:
0 to 3 inches—very dark gray clay loam

Subsoil:
3 to 10 inches—very dark gray clay loam
10 to 17 inches—gray, calcareous clay loam
17 to 46 inches—light brownish gray, mottled, calcareous clay loam

Underlying layer:
46 to 60 inches—grayish brown, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Moderate
Surface runoff: Medium

Inclusions

Contrasting inclusions:
- The sodium-affected Dudley soils on foot slopes
- Houdek soils, which have more sand in the subsoil than the Homme soil and are in similar landscape positions
- The moderately well drained Onita and Prosper soils on foot slopes
- The moderately well drained Plankinton and Tetonka soils in basins

Similar inclusions:
- Homme soils that have a surface layer of silt loam
- Peno soils that have lime leached to a depth of 12 inches or more

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, green needlegrass, intermediate wheatgrass, and smooth bromegrass
Management concerns: Controlling erosion, improving tilth in the Peno soil
Management measures:
- Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion and improve tilth.
- Contour farming, grassed waterways, and terraces help to control erosion, but slopes generally are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: Homme—IIe-2; Peno—IIIe-12
Range site: Homme—Silty; Peno—Clayey
Windbreak suitability group: Homme—3; Peno—4

HpC—Homme-Peno complex, 6 to 9 percent slopes

Composition

Homme soil and similar inclusions: 40 to 50 percent
Peno soil and similar inclusions: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Homme—back slopes; Peno—shoulder slopes and upper back slopes
Slope range: 6 to 9 percent
Shape of areas: Irregular
Size of areas: 5 to more than 100 acres

Typical Profile

Homme

Surface layer:
0 to 8 inches—dark grayish brown silty clay loam
Subsoil:
8 to 25 inches—dark brown and light olive brown silty clay loam
25 to 45 inches—pale brown, calcareous silty clay loam
Underlying layer:
45 to 60 inches—grayish brown, calcareous clay loam

Peno

Surface layer:
0 to 3 inches—very dark gray clay loam
Subsoil:
3 to 10 inches—very dark gray clay loam
10 to 17 inches—gray, calcareous clay loam
17 to 46 inches—light brownish gray, mottled, calcareous clay loam
Underlying layer:
46 to 60 inches—grayish brown, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Moderate
Surface runoff: Medium

Inclusions

Contrasting inclusions:
- The sodium-affected Dudley soils on foot slopes
- Ethan soils, which have more sand than the Peno soil and are in similar landscape positions
- The moderately well drained Onita and Prosper soils on foot slopes
- The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
- Homme soils that have a surface layer of silt loam
- Peno soils that have lime leached to a depth of 12 inches or more

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, green needlegrass, intermediate wheatgrass, and smooth bromegrass
Management concerns: Controlling erosion, improving tilth in the Peno soil

Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion and improve tilth.
• Contour farming, grassed waterways, and terraces also can help to control erosion, but slopes generally are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: Homme—IIIe-1; Peno—IVe-3
Range site: Homme—Silty; Peno—Clayey
Windbreak suitability group: Homme—3; Peno—4

HrA—Houdek-Dudley complex, 0 to 3 percent slopes

Composition

Houdek soil and similar inclusions: 45 to 55 percent
Dudley soil and similar inclusions: 35 to 45 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Houdek—back slopes; Dudley—lower back slopes and foot slopes
Slope range: 0 to 3 percent
Shape of areas: Irregular
Size of areas: 5 to 10 acres

Typical Profile

Houdek

Surface layer:
0 to 5 inches—very dark grayish brown loam
Subsoil:
5 to 14 inches—dark grayish brown clay loam
14 to 25 inches—grayish brown, calcareous clay loam
25 to 36 inches—pale brown, mottled, calcareous clay loam
Underlying layer:
36 to 60 inches—light brownish gray, mottled, calcareous clay loam

Dudley

Surface layer:
0 to 4 inches—dark gray silt loam
4 to 6 inches—grayish brown silt loam
Subsoil:
6 to 21 inches—grayish brown and dark grayish brown clay loam
21 to 45 inches—light brownish gray and pale olive, calcareous clay loam that has accumulations of salts
Underlying layer:
45 to 60 inches—pale olive, calcareous clay loam

Soil Properties and Qualities

Drainage class: Houdek—well drained; Dudley—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Houdek—moderately slow; Dudley—slow
Available water capacity: Houdek—high; Dudley—moderate
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Jerauld soils, which have visible salts within a depth of 16 inches and are on foot slopes
• The moderately well drained Onita and Prosper soils, which do not have a sodium-affected subsoil and are on foot slopes
• The poorly drained Plankinton and Tetonka soils in basins
Similar inclusions:
• Houdek soils that have a surface layer of silt loam or that have more clay in the subsoil

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, green needlegrass, and intermediate wheatgrass
Management concerns: A sodium-affected subsoil in the Dudley soil that adversely affects crop growth by restricting root penetration and the rate of water intake
Management measures:
• Leaving crop residue on the surface, ensuring timely tillage, chiseling and subsoiling, and including grasses and legumes in the crop rotation improve tilth and increase the rate of water intake.

Interpretive Groups

Land capability classification: Houdek—IIc-2; Dudley—IVs-2
Range site: Houdek—Silty; Dudley—Claypan
Windbreak suitability group: Houdek—3; Dudley—9

HtB—Houdek-Dudley-Jerauld complex, 2 to 6 percent slopes

Composition

Houdek soil and similar inclusions: 35 to 45 percent

Dudley soil and similar inclusions: 30 to 40 percent
Jerauld soil and similar inclusions: 15 to 25 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Houdek—summits and back slopes; Dudley—upper back slopes and foot slopes; Jerauld—lower back slopes and foot slopes
Slope range: Houdek and Dudley—2 to 6 percent; Jerauld—2 to 5 percent
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Houdek

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 14 inches—dark grayish brown clay loam
14 to 25 inches—grayish brown, calcareous clay loam
25 to 36 inches—pale brown, mottled, calcareous clay loam

Underlying layer:
36 to 60 inches—light brownish gray, mottled, calcareous clay loam

Dudley

Surface layer:
0 to 4 inches—dark gray silt loam

Subsurface layer:
4 to 6 inches—grayish brown silt loam

Subsoil:
6 to 21 inches—grayish brown and dark grayish brown clay loam
21 to 45 inches—light brownish gray and pale olive, calcareous clay loam that has accumulations of salts

Underlying layer:
45 to 60 inches—pale olive, calcareous clay loam

Jerauld

Surface layer:
0 to 3 inches—gray loam

Subsoil:
3 to 9 inches—dark gray and dark grayish brown clay
9 to 17 inches—dark grayish brown clay that has accumulations of salts
17 to 21 inches—grayish brown, calcareous clay loam that has accumulations of salts
21 to 41 inches—light brownish gray, calcareous clay loam that has accumulations of salts

Underlying layer:
41 to 60 inches—light brownish gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Houdek—well drained; Dudley and Jerauld—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Houdek—moderately slow; Dudley and Jerauld—slow
Available water capacity: Houdek—high; Dudley and Jerauld—moderate
Organic matter content: Houdek and Dudley—moderate; Jerauld—low
Surface runoff: Houdek—medium; Dudley and Jerauld—slow

Inclusions

Contrasting inclusions:
• Ethan soils, which have lime at or near the surface and are on shoulder slopes
• The poorly drained Plankinton soils in basins

Similar inclusions:
• Houdek soils that have more clay in the subsoil or that have a surface layer of silt loam

Use and Management

Cropland and pasture

General management considerations:
• Most of the acreage supports native grasses and is grazed or used for hay.
Main crops: Alfalfa, small grain, and sorghum
Suitable pasture plants: Alfalfa, green needlegrass, intermediate wheatgrass, and western wheatgrass in areas of the Houdek and Dudley soils
Management concerns: Erosion, a sodium-affected subsoil in the Dudley and Jerauld soils that adversely affects crop growth by restricting root penetration and the rate of water intake
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion and improve tilth.
• Chiseling and subsoiling improve tilth and increase the rate of water intake for a short period.

Interpretive Groups

Land capability classification: Houdek—IIe-2; Dudley—IVs-3; Jerauld—VIs-1
Range site: Houdek—Silty; Dudley—Claypan; Jerauld—Thin Claypan

Windbreak suitability group: Houdek—3; Dudley—9; Jerauld—10

HwB—Houdek-Ethan-Prosper loams, 1 to 5 percent slopes

Composition

Houdek soil and similar inclusions: 40 to 50 percent
Ethan soil and similar inclusions: 15 to 30 percent
Prosper soil and similar inclusions: 10 to 15 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Houdek—summits and back slopes; Ethan—shoulder slopes; Prosper—foot slopes
Slope range: Houdek and Ethan—2 to 5 percent; Prosper—1 to 2 percent
Shape of areas: Irregular
Size of areas: 20 to more than 1,000 acres

Typical Profile

Houdek

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 14 inches—dark grayish brown clay loam
14 to 25 inches—grayish brown, calcareous clay loam
25 to 36 inches—pale brown, mottled, calcareous clay loam

Underlying layer:
36 to 60 inches—light brownish gray, mottled, calcareous clay loam

Ethan

Surface layer:
0 to 8 inches—grayish brown, calcareous loam

Subsoil:
8 to 22 inches—pale brown, calcareous loam
22 to 37 inches—light gray, mottled, calcareous loam

Underlying layer:
37 to 60 inches—light gray, mottled, calcareous loam

Prosper

Surface layer:
0 to 10 inches—dark grayish brown loam

Subsoil:
10 to 23 inches—dark grayish brown clay loam
23 to 27 inches—brown, calcareous clay loam
27 to 41 inches—light yellowish brown, calcareous loam

Underlying layer:
41 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Houdek and Ethan—well drained; Prosper—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Houdek and Ethan—more than 6 feet; Prosper—3 to 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Houdek—moderate; Ethan—low; Prosper—high
Surface runoff: Houdek and Ethan—medium; Prosper—slow

Inclusions

Contrasting inclusions:
• The sodium-affected Dudley soils on foot slopes
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Houdek soils that have a less clayey subsoil or that have stratified underlying material
• Prosper soils that have a subsoil that is loam throughout

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Water erosion, a high content of lime in the Ethan soil that adversely affects the availability of plant nutrients
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility.
• Contour farming, grassed waterways, and terraces help to control erosion, but slopes in most areas are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: Houdek—IIe-2; Ethan—IIIe-12; Prosper—IIc-3
Range site: Houdek and Ethan—Silty; Prosper—Overflow
Windbreak suitability group: Houdek—3; Ethan—8; Prosper—1

HwC—Houdek-Ethan-Prosper loams, 2 to 9 percent slopes

Composition

Houdek soil and similar inclusions: 30 to 50 percent
Ethan soil and similar inclusions: 20 to 40 percent
Prosper soil and similar inclusions: 10 to 20 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Houdek—summits and back slopes; Ethan—shoulder slopes; Prosper—foot slopes
Slope range: Houdek and Ethan—6 to 9 percent; Prosper—2 to 3 percent
Shape of areas: Irregular
Size of areas: 10 to more than 100 acres

Typical Profile

Houdek

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 14 inches—dark grayish brown clay loam
14 to 25 inches—grayish brown, calcareous clay loam
25 to 36 inches—pale brown, mottled, calcareous clay loam

Underlying layer:
36 to 60 inches—light brownish gray, mottled, calcareous clay loam

Ethan

Surface layer:
0 to 8 inches—grayish brown, calcareous loam

Subsoil:
8 to 22 inches—pale brown, calcareous loam
22 to 37 inches—light gray, mottled, calcareous loam

Underlying layer:
37 to 60 inches—light gray, mottled, calcareous loam

Prosper

Surface layer:
0 to 10 inches—dark grayish brown loam

Subsoil:
10 to 23 inches—dark grayish brown clay loam
23 to 27 inches—brown, calcareous clay loam
27 to 41 inches—light yellowish brown, calcareous loam

Underlying layer:
41 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Houdek and Ethan—well drained; Prosper—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Houdek and Ethan—more than 6 feet; Prosper—3 to 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Houdek—moderate; Ethan—low; Prosper—high
Surface runoff: Houdek and Ethan—medium; Prosper—slow

Inclusions

Contrasting inclusions:
• The sodium-affected Dudley soils on foot slopes
• The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
• Houdek soils that have a less clayey or less sandy subsoil
• Ethan soils that are dark to a depth of less than 7 inches
• Prosper soils that have a subsoil that is loam throughout

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Water erosion, a high content of lime in the Ethan soil that adversely affects the availability of plant nutrients
Management measures:
• Minimizing tillage, leaving crop residue on the surface, planting close-sown crops, and including grasses and legumes in the cropping system help to control erosion, conserve moisture, and improve fertility.
• Terraces, contour farming, and grassed waterways help to control erosion, but slopes in most areas are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: Houdek—IIIe-2; Ethan—IVe-3; Prosper—IIc-3
Range site: Houdek and Ethan—Silty; Prosper—Overflow
Windbreak suitability group: Houdek—3; Ethan—8; Prosper—1

HyA—Houdek-Prosper loams, 0 to 3 percent slopes

Composition

Houdek soil and similar inclusions: 50 to 60 percent

Prosper soil and similar inclusions: 20 to 30 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Till plains
Landform position: Houdek—summits and back slopes; Prosper—foot slopes
Slope range: Houdek—0 to 3 percent; Prosper—0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to more than 200 acres

Typical Profile

Houdek

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 14 inches—dark grayish brown clay loam
14 to 25 inches—grayish brown, calcareous clay loam
25 to 36 inches—pale brown, mottled, calcareous clay loam

Underlying layer:
36 to 60 inches—light brownish gray, mottled, calcareous clay loam

Prosper

Surface layer:
0 to 10 inches—dark grayish brown loam

Subsoil:
10 to 23 inches—dark grayish brown clay loam
23 to 27 inches—brown, calcareous clay loam
27 to 41 inches—light yellowish brown, calcareous loam

Underlying layer:
41 to 60 inches—light gray, mottled, calcareous loam

Soil Properties and Qualities

Drainage class: Houdek—well drained; Prosper—moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: Houdek—more than 6 feet; Prosper—3 to 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: High
Organic matter content: Houdek—moderate; Prosper—high
Surface runoff: Slow

Inclusions

Contrasting inclusions:
- The sodium-affected Dudley soils on back slopes
- Ethan soils, which have lime at or near the surface and are on shoulder slopes
- The poorly drained Plankinton and Tetonka soils in basins

Similar inclusions:
- Prosper soils that have a subsoil that is loam throughout

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Conserving moisture
Management measures:
- Leaving crop residue on the surface conserves moisture.

Interpretive Groups

Land capability classification: Houdek—IIc-2; Prosper—IIc-3
Range site: Houdek—Silty; Prosper—Overflow
Windbreak suitability group: Houdek—3; Prosper—1

Ln—Lane silty clay loam

Composition

Lane soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Fans
Landform position: Foot slopes
Shape of areas: Long and narrow or irregular
Size of areas: 20 to 400 acres

Typical Profile

Surface layer:
0 to 8 inches—dark gray silty clay loam

Subsoil:
8 to 22 inches—dark gray silty clay
22 to 30 inches—dark gray, calcareous silty clay
30 to 50 inches—grayish brown, calcareous silty clay

Underlying layer:
50 to 60 inches—grayish brown, calcareous silty clay loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: Rare
Permeability: Slow
Available water capacity: High
Organic matter content: High
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The well drained Beadle soils in the higher landscape positions
• Bon soils, which have less clay and more sand than the Lane soil and are on flood plains
• The well drained Davis soils in landscape positions similar to those of the Lane soil
• The sodium-affected Jerauld soils on the lower foot slopes

Similar inclusions:
• Soils that have lime at a depth of more than 22 inches
• Soils that contain gypsum and other salts in the lower part of the subsoil

Use and Management

Cropland and pasture

Main crops: Alfalfa and small grain
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Conserving moisture, improving tilth, increasing the rate of water intake
Management measures:
• Minimizing tillage, including grasses and legumes in the cropping system, and leaving crop residue on the surface conserve moisture and help to maintain tilth.
• Chiseling and subsoiling improve tilth and increase the rate of water intake.

Interpretive Groups

Land capability classification: IIs-1
Range site: Clayey
Windbreak suitability group: 3

Lw—Lawet loam

Composition

Lawet soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Flood plains
Landform position: Low flood plains
Shape of areas: Irregular
Size of areas: 10 to more than 100 acres

Typical Profile

Surface soil:
0 to 14 inches—very dark grayish brown, calcareous loam

Subsoil:
14 to 28 inches—gray, calcareous loam and clay loam

Underlying layer:
28 to 55 inches—light brownish gray, calcareous loam and sandy loam
55 to 60 inches—grayish brown, calcareous clay loam

Soil Properties and Qualities

Drainage class: Poorly drained
Depth class: Very deep
Depth to the seasonal high water table: 1 to 2 feet
Flooding: Rare
Permeability: Moderate
Available water capacity: Moderate
Organic matter content: Moderate or high
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Baltic soils, which have more clay than the Lawet soil and are in the slightly lower areas
• The well drained and moderately well drained Bon soils in the slightly higher areas on flood plains
• The sodium-affected, poorly drained Durrstein soils and the poorly drained Egas soils in the lower areas on flood plains
• The poorly drained Fedora soils, which have less clay than the Lawet soil and are in similar landscape positions

Use and Management

Cropland and pasture

General management considerations:
• Most of the acreage supports native grasses and is grazed or used for hay.
• Timely planting is nearly impossible in the wettest years.
• If cultivated, the soil is best suited to crops that are planted in late spring, such as corn or sorghum, because the wetness commonly delays planting.
Suitable pasture plants: Alfalfa, Garrison creeping foxtail, smooth bromegrass, and switchgrass
Management concerns: Wetness, wind erosion, a high content of lime that adversely affects the availability of plant nutrients
Management measures:
• Chiseling and subsoiling increase the rate of water intake.
• Returning crop residue to the soil, applying animal manure, deferring tillage when the soil is wet, and including grasses and legumes in the cropping system conserve moisture, improve fertility, and help to control erosion.

Interpretive Groups

Land capability classification: IVw-1
Range site: Subirrigated
Windbreak suitability group: 2

On—Onita silt loam, 0 to 3 percent slopes

Composition

Onita soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Till plains
Landform position: Foot slopes
Shape of areas: Long and narrow
Size of areas: 5 to 45 acres

Typical Profile

Surface soil:
0 to 17 inches—dark gray and dark grayish brown silt loam

Subsoil:
17 to 29 inches—dark gray silty clay
29 to 40 inches—dark gray, calcareous silty clay
40 to 50 inches—grayish brown, mottled, calcareous silty clay loam
50 to 60 inches—light brownish gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Depth class: Very deep
Depth to the seasonal high water table: 2.5 to 6.0 feet
Flooding: Frequency—frequent; duration—brief
Permeability: Moderately slow
Available water capacity: High
Organic matter content: High
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• The well drained Eakin and Houdek soils in landscape positions higher than those of the Onita soil
• The poorly drained Plankinton and Tetonka soils in basins
• Prosper soils, which have less clay and more sand in the subsoil than the Onita soil and are on foot slopes

Similar inclusions:
• Soils that have less clay in the subsoil

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, smooth bromegrass, and switchgrass
Management concerns: Conserving moisture
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture.

Interpretive Groups

Land capability classification: IIc-3
Range site: Overflow
Windbreak suitability group: 1

Op—Onita-Plankinton silt loams

Composition

Onita soil and similar inclusions: 60 to 80 percent
Plankinton soil and similar inclusions: 20 to 40 percent
Contrasting inclusions: 1 to 15 percent

Setting

Landform: Till plains
Landform position: Onita—foot slopes; Plankinton—toe slopes and basins
Slope range: Onita—0 to 2 percent; Plankinton—0 to 1 percent
Shape of areas: Long and narrow or irregular
Size of areas: 10 to more than 100 acres

Typical Profile

Onita

Surface soil:
0 to 17 inches—dark gray and dark grayish brown silt loam

Subsoil:
17 to 29 inches—dark gray silty clay
29 to 40 inches—dark gray, calcareous silty clay
40 to 50 inches—grayish brown, mottled, calcareous silty clay loam
50 to 60 inches—light brownish gray, mottled, calcareous clay loam

Plankinton

Surface layer:
0 to 5 inches—gray silt loam
5 to 9 inches—light brownish gray silt loam

Subsoil:
9 to 50 inches—grayish brown, calcareous silty clay

Underlying layer:
50 to 60 inches—grayish brown, mottled, calcareous silty clay

Soil Properties and Qualities

Drainage class: Onita—moderately well drained; Plankinton—poorly drained
Depth class: Very deep
Seasonal high water table: Onita—at a depth of 2.5 to 6.0 feet; Plankinton—1.0 foot above to 1.0 foot below the surface
Flooding on the Onita soil: Frequency—frequent; duration—brief

Flooding on the Plankinton soil: None
Permeability: Onita—moderately slow; Plankinton—slow
Available water capacity: High
Organic matter content: Onita—high; Plankinton—moderate or high
Surface runoff: Onita—slow; Plankinton—ponded

Inclusions

Contrasting inclusions:
• The well drained Eakin and Highmore soils in the slightly higher landscape positions
• The very poorly drained Worthing soils in the deepest basins

Similar inclusions:
• Onita soils that have a less clayey subsoil
• Plankinton soils that have a surface layer of silty clay loam
• In places, Plankinton soils in which the combined thickness of the surface layer and subsurface layer is more than 11 inches

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, smooth bromegrass, and switchgrass
Management concerns: Wetness, compaction in the Plankinton soil
Management measures:
• Chiseling and subsoiling increase the rate of water intake.
• Including grasses and legumes in the cropping system and deferring tillage when the soils are wet improve tilth.

Interpretive Groups

Land capability classification: Onita—IIc-3; Plankinton—IVw-1
Range site: Onita—Overflow; Plankinton—Closed Depression
Windbreak suitability group: Onita—1; Plankinton—10

PgC—Peno-Gettys complex, 6 to 9 percent slopes

Composition

Peno soil and similar inclusions: 50 to 60 percent
Gettys soil and similar inclusions: 25 to 35 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landform: Moraines
Landform position: Peno—back slopes; Gettys—shoulder slopes and upper back slopes
Slope range: 6 to 9 percent
Shape of areas: Irregular
Size of areas: 15 to 100 acres

Typical Profile

Peno

Surface layer:
0 to 3 inches—very dark gray clay loam

Subsoil:
3 to 10 inches—very dark gray clay loam
10 to 17 inches—gray, calcareous clay loam
17 to 46 inches—light brownish gray, mottled, calcareous clay loam

Underlying layer:
46 to 60 inches—grayish brown, mottled, calcareous clay loam

Gettys

Surface layer:
0 to 4 inches—dark gray clay loam

Subsoil:
4 to 18 inches—grayish brown, mottled, calcareous clay loam
18 to 28 inches—pale brown, mottled, calcareous clay loam

Underlying layer:
28 to 34 inches—light brownish gray, mottled, calcareous clay loam
34 to 60 inches—grayish brown and light brownish gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderately slow
Available water capacity: Peno—high; Gettys—moderate or high
Organic matter content: Peno—moderate; Gettys—low
Surface runoff: Peno—medium; Gettys—rapid

Inclusions

Contrasting inclusions:
• Ethan soils, which have less clay than the Peno soil and are in similar landscape positions
• The moderately well drained Onita soils on foot slopes

Similar inclusions:
• Peno soils that have lime leached to a depth of 12 inches or more
• Gettys soils that have less clay

Use and Management

Cropland and pasture

General management considerations:
• Most areas support native grasses and are grazed or used for hay.
Main crops: Alfalfa, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Water erosion, a high content of lime in the surface layer of the Gettys soil that adversely affects the availability of plant nutrients
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to control erosion and improve fertility.
• Chiseling and subsoiling improve tilth and increase the rate of water intake.
• Contour farming, grassed waterways, and terraces help to control erosion, but slopes in some areas are too short or too irregular for contouring and terracing.

Interpretive Groups

Land capability classification: IVe-3
Range site: Peno—Clayey; Gettys—Thin Upland
Windbreak suitability group: Peno—4; Gettys—8

Ph—Pits, gravel

Composition

Pits and similar inclusions: 90 to 95 percent
Contrasting inclusions: 5 to 10 percent

Setting

Landform: Outwash plains
Landform position: Summits, shoulder slopes, and back slopes
Shape of areas: Irregular
Size of areas: 2 to 50 acres

Typical Profile

• The bottom of pits generally is sand and gravel; it is loamy glacial till or silty glacial till in areas where all of the sand and gravel has been removed.
• Mounds of mixed loamy overburden are at the edges of the excavated areas.

Soil Properties and Qualities

Drainage class: Excessively drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Rapid
Available water capacity: Low
Organic matter content: Low
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Talmo soils, which are dark to a depth of more than 7 inches in undisturbed areas

Use and Management

Cropland and pasture

General management considerations:
• This unit is unsuited to cropland and pasture.
• Most gravel pits are used only as a source of sand and gravel for construction purposes; some pits provide limited wildlife habitat.
• The bottom and sides of pits support little or no vegetation during periods when gravel is being removed.
• Abandoned gravel pits can be restored to range, tame pasture, or cropland if reclamation measures are applied.
Management measures:
• Land shaping and using the mounds of overburden material as topsoil dressing are needed to reclaim areas of this unit.
• Applying fertilizer as needed helps to establish range or pasture plants.

Interpretive Groups

Land capability classification: VIIIs-2
Range site: None assigned
Windbreak suitability group: None assigned

Pk—Plankinton silt loam

Composition

Plankinton soil and similar inclusions: 85 to 99 percent
Contrasting inclusions: 1 to 15 percent

Setting

Landform: Till plains
Landform position: Basins
Shape of areas: Oval or oblong
Size of areas: 3 to 40 acres

Typical Profile

Surface layer:
0 to 5 inches—gray silt loam
Subsurface layer:
5 to 9 inches—light brownish gray silt loam
Subsoil:
9 to 39 inches—dark gray clay
39 to 50 inches—grayish brown, calcareous silty clay

Underlying layer:
50 to 60 inches—grayish brown, mottled, calcareous silty clay

Soil Properties and Qualities

Drainage class: Poorly drained
Depth class: Very deep
Seasonal high water table: 1 foot above to 1 foot below the surface
Flooding: None
Permeability: Slow
Available water capacity: High
Organic matter content: Moderate or high
Surface runoff: Ponded during periods of snowmelt and heavy rainfall

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Crossplain soils in landscape positions slightly higher than those of the Plankinton soil
• The well drained Eakin and Houdek soils in the higher areas
• The moderately well drained Onita and Prosper soils on foot slopes

Similar inclusions:
• Soils that have a surface layer of silty clay loam
• Soils in which the combined thickness of the surface layer and subsurface layer is more than 11 inches

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Creeping foxtail and reed canarygrass
Management concerns: Wetness
Management measures:
• Planting should be delayed in wet years.
• Restricted grazing during wet periods helps to prevent compaction and the deterioration of tilth.
• Existing drains should be maintained.

Interpretive Groups

Land capability classification: IVw-1
Range site: Closed Depression
Windbreak suitability group: 10

Pr—Plankinton-Crossplain complex

Composition

Plankinton soil and similar inclusions: 60 to 70 percent
Crossplain soil and similar inclusions: 15 to 25 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Till plains
Landform position: Plankinton—toe slopes and basins; Crossplain—upper toe slopes
Slope range: 0 to 1 percent
Shape of areas: Elongated
Size of areas: 10 to 100 acres

Typical Profile

Plankinton

Surface layer:
0 to 5 inches—gray silt loam
5 to 9 inches—light brownish gray silt loam

Subsoil:
9 to 39 inches—dark gray clay
39 to 50 inches—grayish brown, calcareous silty clay

Underlying layer:
50 to 60 inches—grayish brown, mottled, calcareous silty clay

Crossplain

Surface layer:
0 to 8 inches—gray loam

Subsoil:
8 to 28 inches—dark gray clay loam
28 to 43 inches—light gray, mottled, calcareous clay loam

Underlying layer:
43 to 60 inches—light gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Plankinton—poorly drained; Crossplain—somewhat poorly drained
Depth class: Very deep
Seasonal high water table: Plankinton—1.0 foot above to 1.0 foot below the surface; Crossplain—at a depth 0.5 foot to 3.0 feet
Flooding on the Plankinton soil: None
Flooding on the Crossplain soil: Frequency—frequent; duration—brief
Permeability: Slow
Available water capacity: High
Organic matter content: Moderate or high
Surface runoff: Plankinton—ponded by runoff from adjacent uplands; Crossplain—very slow

Inclusions

Contrasting inclusions:
• The well drained Clarno and Houdek soils in the higher landscape positions

Similar inclusions:
• Plankinton soils in which the combined thickness of

the surface layer and subsurface layer is more than 11 inches
• In plowed areas, Plankinton soils that have a surface layer of silty clay loam
• Crossplain soils that have less clay in the subsoil and are moderately well drained

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Creeping foxtail and reed canarygrass
Management concerns: Wetness
Management measures:
• Existing drains should be maintained.
• Planting should be delayed in wet years.
• Measures that control runoff from adjacent soils, such as farming on the contour and minimizing tillage, help to control wetness.
• Chiseling and subsoiling increase the rate of water intake.

Interpretive Groups

Land capability classification: Plankinton—IVw-1; Crossplain—IIw-1
Range site: Plankinton—Closed Depression; Crossplain—Overflow
Windbreak suitability group: Plankinton—10; Crossplain—2

ReA—Ree loam, 0 to 2 percent slopes

Composition

Ree soil and similar inclusions: 90 to 99 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Outwash plains
Landform position: Back slopes and upper foot slopes
Shape of areas: Irregular
Size of areas: 5 to more than 100 acres

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown loam
Subsoil:
5 to 14 inches—dark grayish brown and brown clay loam
14 to 37 inches—pale brown and light brownish gray, calcareous loam
Underlying layer:
37 to 53 inches—light brownish gray, calcareous sandy clay loam
53 to 60 inches—multicolored, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderate
Available water capacity: Moderate or high
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Canning soils, which have gravelly material at a depth of 20 to 40 inches and are on slight rises
• The moderately well drained Prosper soils on foot slopes
Similar inclusions:
• Soils that do not have gravelly sand within a depth of 60 inches

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, crested wheatgrass, and smooth bromegrass
Management concerns: Conserving moisture
Management measures:
• Leaving crop residue on the surface conserves moisture.
• Leaving vegetative barriers that can catch snow conserves moisture.

Interpretive Groups

Land capability classification: IIc-2
Range site: Silty
Windbreak suitability group: 3

ReB—Ree loam, 2 to 6 percent slopes

Composition

Ree soil and similar inclusions: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Setting

Landform: Outwash plains
Landform position: Back slopes and upper foot slopes
Shape of areas: Irregular
Size of areas: 5 to 75 acres

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 14 inches—dark grayish brown and brown clay loam
14 to 37 inches—pale brown and light brownish gray, calcareous loam
Underlying layer:
37 to 53 inches—light brownish gray, calcareous sandy clay loam
53 to 60 inches—multicolored, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Moderate
Available water capacity: Moderate or high
Organic matter content: Moderate
Surface runoff: Medium

Inclusions

Contrasting inclusions:
• Canning soils, which have gravelly material at a depth of 20 to 40 inches and are on summits and the upper back slopes
• Ethan soils, which have lime at or near the surface and are on shoulder slopes
• The moderately well drained Prosper soils on foot slopes
Similar inclusions:
• Soils that do not have gravelly sand within a depth of 60 inches

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, intermediate wheatgrass, and smooth bromegrass
Management concerns: Erosion
Management measures:
• Minimizing tillage, leaving crop residue on the surface, and farming on the contour help to control erosion and conserve moisture.

Interpretive Groups

Land capability classification: IIe-1
Range site: Silty
Windbreak suitability group: 3

RnA—Ree-Canning loams, 0 to 2 percent slopes

Composition

Ree soil and similar inclusions: 55 to 75 percent
Canning soil and similar inclusions: 20 to 30 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Outwash plains
Landform position: Ree—back slopes and upper foot slopes; Canning—summits and upper back slopes
Slope range: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 10 to more than 100 acres

Typical Profile

Ree

Surface layer:
0 to 5 inches—dark grayish brown loam
Subsoil:
5 to 14 inches—dark grayish brown and brown clay loam
14 to 37 inches—pale brown and light brownish gray, calcareous loam
Underlying layer:
37 to 53 inches—light brownish gray, calcareous sandy clay loam
53 to 60 inches—multicolored, calcareous gravelly sand

Canning

Surface layer:
0 to 7 inches—dark grayish brown loam
Subsoil:
7 to 16 inches—grayish brown clay loam
16 to 33 inches—brown and light brownish gray, calcareous clay loam
Underlying layer:
33 to 60 inches—multicolored, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to a contrasting or impervious layer: Ree—more than 40 inches; Canning—20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Ree—moderate; Canning—moderate in the upper part and rapid in the gravelly underlying material
Available water capacity: Ree—moderate or high; Canning—moderate
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Delmont soils, which have sandy or gravelly material within a depth of 20 inches and are in landscape positions similar to those of the Canning soil

Similar inclusions:
• Ree soils that have gravelly sand below a depth of 60 inches
• Canning soils that are dark below a depth of 20 inches

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, crested wheatgrass, and smooth bromegrass
Management concerns: Moisture conservation, the moderate available water capacity in the Canning soil
Management measures:
• Minimizing tillage and leaving vegetative barriers that can catch snow conserve moisture.

Interpretive Groups

Land capability classification: Ree—IIc-2; Canning—IIIs-2
Range site: Silty
Windbreak suitability group: Ree—3; Canning—6

RnB—Ree-Canning loams, 2 to 6 percent slopes

Composition

Ree soil and similar inclusions: 45 to 55 percent
Canning soil and similar inclusions: 40 to 50 percent
Contrasting inclusions: 1 to 10 percent

Setting

Landform: Outwash plains
Landform position: Ree—back slopes and upper foot slopes; Canning—summits and upper back slopes
Slope range: 2 to 6 percent
Shape of areas: Irregular
Size of areas: 10 to 80 acres

Typical Profile

Ree

Surface layer:
0 to 5 inches—dark grayish brown loam

Subsoil:
5 to 14 inches—dark grayish brown and brown clay loam
14 to 37 inches—pale brown and light brownish gray, calcareous loam

Underlying layer:
37 to 53 inches—light brownish gray, calcareous sandy clay loam
53 to 60 inches—multicolored, calcareous gravelly sand

Canning

Surface layer:
0 to 7 inches—dark grayish brown loam

Subsoil:
7 to 16 inches—grayish brown clay loam
16 to 33 inches—brown and light brownish gray, calcareous clay loam

Underlying layer:
33 to 60 inches—multicolored, calcareous gravelly sand

Soil Properties and Qualities

Drainage class: Well drained
Depth class: Very deep
Depth to a contrasting or impervious layer: Ree—more than 40 inches; Canning—20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Permeability: Ree—moderate; Canning—moderate in the upper part and rapid in the gravelly underlying material
Available water capacity: Ree—moderate or high; Canning—moderate
Organic matter content: Moderate
Surface runoff: Slow

Inclusions

Contrasting inclusions:
• Delmont soils, which have sandy or gravelly material within a depth of 20 inches and are in landscape positions similar to those of the Canning soil

Similar inclusions:
• Ree soils that have gravelly sand below a depth of 60 inches
• Canning soils that are dark below a depth of 20 inches

Use and Management

Cropland and pasture

Main crops: Alfalfa, corn, small grain, and sorghum
Suitable pasture plants: Alfalfa, crested wheatgrass, and smooth bromegrass
Management concerns: Erosion, the moderate available water capacity
Management measures:
• Minimizing tillage and leaving crop residue on the surface conserve moisture and help to control erosion.

Interpretive Groups

Land capability classification: Ree—IIe-1; Canning—IIIe-6
Range site: Silty
Windbreak suitability group: Ree—3; Canning—6

Te—Tetonka silt loam

Composition

Tetonka soil and similar inclusions: 85 to 99 percent
Contrasting inclusions: 1 to 15 percent

Setting

Landform: Till plains
Landform position: Basins
Shape of areas: Oval or oblong
Size of areas: 4 to 60 acres

Typical Profile

Surface layer:
0 to 6 inches—dark gray silt loam
Subsurface layer:
6 to 15 inches—gray and light gray silt loam
Subsoil:
15 to 35 inches—gray and dark gray silty clay
35 to 50 inches—gray, calcareous silty clay
50 to 60 inches—olive gray, calcareous clay loam

Soil Properties and Qualities

Drainage class: Poorly drained
Depth class: Very deep
Seasonal high water table: 1 foot above to 1 foot below the surface
Flooding: None
Permeability: Slow
Available water capacity: High
Organic matter content: Moderate
Surface runoff: Ponded following periods of snowmelt and heavy rainfall

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Crossplain soils on toe slopes
• The moderately well drained Onita and Prosper soils on foot slopes
• The very poorly drained Worthing soils in the lower part of basins
Similar inclusions:
• Soils in which the combined thickness of the surface layer and subsurface layer is less than 10 inches

Use and Management

Cropland and pasture

General management considerations:
• Most areas support native grasses and are grazed or used for hay.
• This soil is best suited to crops that mature late in the growing season.
Suitable pasture plants: Creeping foxtail and reed canarygrass
Management concerns: Wetness
Management measures:
• Planting should be delayed in wet years.
• Restricted grazing during wet periods helps to prevent surface compaction and the deterioration of tilth.
• Existing drains should be maintained.

Interpretive Groups

Land capability classification: IVw-1
Range site: Wet Meadow
Windbreak suitability group: 10

Wo—Worthing silty clay loam

Composition

Worthing soil and similar inclusions: 85 to 99 percent
Contrasting inclusions: 1 to 15 percent

Setting

Landform: Till plains
Landform position: Basins
Shape of areas: Oval
Size of areas: 4 to more than 100 acres

Typical Profile

Surface layer:
0 to 13 inches—dark gray silty clay loam
Subsoil:
13 to 40 inches—dark gray clay
40 to 60 inches—gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Very poorly drained
Depth class: Very deep
Seasonal high water table: 1 foot above to 1 foot below the surface
Flooding: None
Permeability: Slow
Available water capacity: High
Organic matter content: Moderate or high
Surface runoff: Ponded following periods of snowmelt and heavy rainfall

Inclusions

Contrasting inclusions:
• The poorly drained Plankinton and Tetonka soils in the slightly higher parts of basins
Similar inclusions:
• Soils that have lime throughout

Use and Management

Cropland and pasture

General management considerations:
• The soil is unsuited to cropland.

Suitable pasture plants: Garrison creeping foxtail and reed canarygrass
Management concerns: Wetness
Management measures:
• Restricted grazing during wet periods helps to prevent compaction and the deterioration of tilth.
• Existing drains need to be maintained.

Interpretive Groups

Land capability classification: Vw-4
Range site: Shallow Marsh
Windbreak suitability group: 10

Wp—Worthing silty clay loam, ponded

Composition

Worthing soil and similar inclusions: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Setting

Landform: Till plains
Landform position: Basins
Shape of areas: Oval
Size of areas: 4 to more than 100 acres

Typical Profile

Surface layer:
0 to 13 inches—dark gray silty clay loam
Subsoil:
13 to 40 inches—dark gray clay
40 to 60 inches—gray, mottled, calcareous clay loam

Soil Properties and Qualities

Drainage class: Very poorly drained
Depth class: Very deep
Seasonal high water table: 3.0 feet above to 0.5 foot below the surface
Flooding: None
Permeability: Slow
Available water capacity: High
Organic matter content: Moderate or high
Surface runoff: Ponded

Inclusions

Similar inclusions:
• Soils that have a thin layer of partly decomposed organic material on the surface
• Soils that have lime throughout

Use and Management

Cropland and pasture

General management considerations:
• The soil is unsuited to cropland and pasture.
• The soil is best suited to wetland wildlife habitat.
Management concerns: Wetness, ponding most of the year

Interpretive Groups

Land capability classification: VIIIw-1
Range site: Not assigned
Windbreak suitability group: 10

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 17,735 acres in Jerauld County, or 5 percent of the total land area, meets the soil requirements for prime farmland. About 1,060 additional acres would meet the requirements if drained. About half of the acreage of the prime farmland is cropland. The main crops are alfalfa, corn, small grain, and sorghum.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the

back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table qualify as prime farmland only in areas where this limitation has been overcome by drainage measures. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not this limitation has been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Various interpretive groups for the soils in the county are listed at the end of each map unit description. The groups for each map unit also are shown in the section "Interpretive Groups," which follows the tables at the back of this survey.

Crops and Pasture

Dennis Shroup, conservation agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 46 percent of the acreage of Jerauld County is used for cultivated crops or for tame pasture and hay *(12)*. The major crops are alfalfa, corn, oats, grain sorghum, and wheat. Barley, rye, oats, sorghum, and wheat are grown for grain, and alfalfa is grown mainly for hay. Alfalfa, intermediate wheatgrass, and smooth bromegrass are grown for tame pasture. Alfalfa seed also is harvested as a cash crop.

The soils in the county have good potential for increased crop production. Currently, about 76,000 acres of potentially good cropland is used as range and about 17,000 acres is used as pasture *(11)*. Crop production could be increased considerably by extending the latest technology for crop production to all of the cropland in the county. This soil survey can greatly facilitate the application of such technology. The paragraphs that follow describe the management needed on the cropland in the county.

Water erosion reduces productivity and results in sedimentation. Productivity is reduced when the more fertile surface layer is lost and part of the subsoil is incorporated into a plow layer. Loss of the surface layer is especially damaging on soils that have a thin surface layer, such as Betts and Gettys soils. Erosion also

reduces the productivity of soils that tend to be droughty, such as Canning and Delmont soils. When erosion occurs, sediment rich in nutrients enters streams and lakes. Measures that control erosion minimize this pollution and preserve water quality for fish and other wildlife, for recreational uses, and for municipal uses. They also reduce the amount of fertilizer needed in cropped areas by helping to prevent the removal of plant nutrients and applied pesticides.

A cropping system that keeps a plant cover on the surface for extended periods holds soil losses to an amount that does not reduce the productive capacity of the soils. If a plant cover cannot protect the soil, careful management of crop residue is essential. Minimizing tillage and leaving crop residue on the surface increase the infiltration rate, reduce the runoff rate, and help to control erosion.

Terraces and diversions help to control erosion by reducing the length of slopes and the runoff rate. They are most practical on very deep, well drained soils that have long, smooth slopes. Some soils, such as Houdek and Eakin, are poorly suited to terraces and diversions because they have short, irregular slopes.

Wind erosion is a slight to severe hazard on many of the soils in the county. It is especially severe on Henkin Variant, Fedora, and Henkin soils. Wind erosion can damage these soils in a few hours if winds are strong and if the soils are dry and are not protected by a plant cover or surface mulch. An adequate plant cover, a cover of crop residue, and a rough surface help to control wind erosion. Windbreaks of suitable trees and shrubs are also effective in controlling erosion.

Information about the measures that control erosion on each kind of soil is contained in the Technical Guide, available in the local office of the Soil Conservation Service.

Soil fertility helps to determine the yields that can be obtained from the soil. A good nutrient management program can help to ensure the nutrients needed by a specific crop and optimize crop yields. The kind and amount of fertilizer needed on soils that have a high content of lime in the surface layer, such as Ethan soils, generally differ from the kind and amount needed on soils that do not have lime in the surface layer. A good nutrient management plan should be based on type of soil, available moisture, the crop selected for planting, a realistic goal for yields, current test levels of soil fertility, whether or not legumes have been planted in either of the last 2 years, whether or not agricultural waste has been applied, and the chance of the pollution of surface water or ground water. The plan should be developed annually and provide information about the amount of each nutrient needed, the form or forms of nutrients to be applied, the time to apply nutrients, the method of application, and the site of application. The Soil Conservation Service, the South Dakota Cooperative Extension Service, and the South Dakota Agricultural Experiment Station can help in developing a management plan.

Soil tilth is an important factor affecting the germination of seeds and the infiltration of water into the soil. Soils that have good tilth are granular and porous. Management can improve or maintain the tilth of a specific soil. Managing a soil for good tilth generally increases the water infiltration rate and the available water capacity and provides a better environment for seedling emergence and root development. Such management has a positive effect on crop yields. Also, if tilth is improved, less horsepower may be needed for tillage equipment.

Good tilth management includes planting high-residue crops in a rotation system most of the time; keeping equipment and livestock off the soil during wet periods, especially on soils such as Worthing and Artesian; leaving as much residue as possible on or near the surface of the soil; and eliminating unnecessary tillage operations.

Field crops suited to the soils and climate of the county include close-growing crops and row crops. Oats and wheat are the main close-growing crops. Corn and sorghum are the main row crops.

The very deep, well drained or moderately well drained soils are suited to all of the crops commonly grown in the county. Examples are Bon, Clarno, Eakin, Houdek, and Onita soils. Canning and other droughty soils are better suited to early maturing small grain than to the deeper rooted crops, such as corn and alfalfa, because they have porous underlying material, which has a low available water capacity and limits the rooting depth of many plants. Henkin and other soils that are susceptible to wind erosion are better suited to high-residue crops, such as small grain, corn grown for grain, and alfalfa, that can protect fields from wind erosion under proper management. Conservation practices, such as field windbreaks or no-till planting, may be needed to control wind erosion in areas of low-residue crops, including soybeans, sunflowers, and summer fallow.

Many of the very deep, well drained soils are suited to irrigation. Examples are Clarno, Eakin, and Ree soils. The main concerns of management are providing water needed for the plant in a timely and efficient manner, providing the necessary nutrients for the plant, providing erosion-control measures, and controlling crop pests in an environmentally acceptable manner. The amount of water needed varies according to the crop, the soil, the climate, and the efficiency of the irrigation system. The Soil Conservation Service and the Cooperative

Extension Service have resources available to assist in the design of good irrigation waste management systems. The quality of the irrigation water is a concern if water from a well is used. The best water has a low content of salts and sodium.

Pasture plants best suited to the climate and most of the soils in the county include alfalfa, intermediate wheatgrass, and smooth bromegrass. Because of the hazard of erosion, bunch grasses, such as crested wheatgrass, should not be planted in areas where the slope is more than 6 percent. In areas of poorly drained Plankinton and Tetonka soils, the choice of pasture plants is limited to water-tolerant species, such as Garrison creeping foxtail and reed canarygrass.

If the pasture is overgrazed, the grasses lose vigor and die and commonly are replaced by annual grasses and by weeds. Proper stocking rates, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include erosion control; a cropping sequence that efficiently uses the available moisture; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the South Dakota Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit *(9)*. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations or hazards that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the

soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6. The capability units are not numbered consecutively because not all of the units in the land capability system are represented in the county.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the section "Interpretive Groups," which follows the tables at the back of this survey.

Rangeland

David W. Schmidt, range conservationist, Soil Conservation Service, helped prepare this section.

Range is land which supports native vegetation suitable for grazing or browsing. It includes areas where native vegetation has been reestablished. The vegetation is mainly grasses, grasslike plants, forbs, or shrubs. The amount and kind of native vegetation growing in any one area are determined by the soil, topography, climate, past use, and management.

All of the county was range before the first permanent settlers arrived. About 51 percent of the county currently supports native vegetation *(3)*. Range supplies a major portion of the forage for livestock in the county.

Approximately 82 percent of the farm and ranch income in the county is derived from the sale of livestock and livestock products. Most of the ranches are cow-calf enterprises, but some are yearling enterprises. Also, some ranches include both cow herds and yearlings. This ranch system allows greater flexibility in adjusting livestock numbers during periods of drought. Sheep are raised in limited numbers throughout the county and are often managed in combination with cow herds. The range generally is grazed from May to October. The forage provided by range generally is supplemented by crop residue and by tame pasture plants, such as intermediate wheatgrass and smooth bromegrass. In winter it is supplemented by protein concentrate and hay.

Jerauld County is part of the mixed-grass prairie. The native vegetation is dominated by mid grasses, such as western wheatgrass, and by forbs, such as prairie coneflower. Tall grasses, such as big bluestem, and short grasses, such as blue grama, are interspersed with the mid grasses. The mixed-grass prairie consists of cool- and warm-season plants that provide good-quality forage throughout the growing season. Most of the growth of the cool-season plants, such as green needlegrass, occurs from April through June. Most of the growth of the warm-season plants, such as big bluestem, occurs from June through August. The cool-season grasses may start growing again in September and October if autumn rainfall is adequate.

The production of native vegetation in many parts of the county is below potential because of past misuse. The tall grasses and some of the mid grasses have been replaced by less desirable plants. In many areas the past misuse has led to an invasion of cool-season tame grasses, such as smooth bromegrass. As a result, the total amount of available forage has been reduced. In most areas, however, the original high-quality plants can be reestablished under good grazing management.

Range Sites and Condition Classes

Different kinds of soil vary in their capacity to produce native vegetation. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important. Soils that produce approximately the same kinds, amounts, and proportions of native vegetation make up a range site. The potential native vegetation on a range site is the stabilized plant community that the site is capable of producing. It consists of the plants that were growing on the site when the region was settled. The plant community maintains itself and changes very little as long as the environment remains unchanged. The relationship between soils and vegetation was ascertained during this survey; thus, range sites generally can be determined directly from the soil map.

The plants within the native plant community are sometimes grouped as decreasers, increasers, or invaders, depending on their response to grazing pressure. *Decreasers* are plants that respond to overgrazing by decreasing in abundance. They generally are the most productive plants and the ones most preferred by the grazing animals. *Increasers* are plants that respond to grazing pressure, at least initially, by increasing in amount as the more desirable decreaser plants become less abundant. Increasers

generally are less productive and less preferred by the grazing animals. *Invaders* are plants that are not part of the original plant community but invade because of some kind of disturbance or continued overgrazing. Some invader plants have little or no value as forage plants.

Because plants do not respond in the same manner to different influences, a plant may be a decreaser on some range sites but an increaser on others. For example, a cool-season plant may be a decreaser if the site is grazed only during the spring but would be an increaser if the same site were grazed only during the summer. The reverse would be true for a warm-season plant. Restricting grazing to the spring would cause the warm-season plants to increase in abundance, and restricting grazing to the summer would cause them to decrease.

Table 7 shows, for nearly all the soils, the range site, the potential natural plant community, and the potential annual production of vegetation in favorable, average, and unfavorable years. *Potential annual production* is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, average, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Range management helps to maintain forage production and provides wildlife habitat, water, and watershed protection. The primary objective of range management is to keep the rangeland in excellent or good condition. The main management concern is responding to important changes in the plant community on a range site.

Range condition is determined by comparing the present vegetation on a range site with the potential native plant community for that site. Four range condition classes are recognized. The range site is in *excellent* condition if 76 to 100 percent of the present vegetation is the same kind as the potential native vegetation, in *good* condition if the percentage is 51 to 75, in *fair* condition if the percentage is 26 to 40, and in *poor* condition if the percentage is 25 or less. Range productivity depends on the range site, the range condition, and the moisture available to plants during the growing season.

Measures that maintain or improve the range condition are needed on all of the range in the county. They include proper stocking rates and rotation grazing or deferred rotation grazing systems. These systems provide rest periods that maintain or improve the vigor of the key plants. Good range management also includes range seeding, fencing, and watering facilities.

The soils in the county are assigned to 17 different range sites. The range sites are Closed Depression, Claypan, Clayey, Dense Clay, Limy Subirrigated, Overflow, Subirrigated, Silty, Saline Lowland, Shallow Marsh, Shallow to Gravel, Sandy, Thin Claypan, Thin Upland, Very Shallow, Wetland, and Wet Meadow. The paragraphs that follow describe these range sites.

Clayey range site. The potential native vegetation on this site is mid and short prairie grasses interspersed with a variety of forbs. Two cool-season grasses, green needlegrass and western wheatgrass, make up about 65 percent of the vegetation in nearly equal portions. Warm-season grasses make up about 30 percent of the vegetation; of these grasses, sideoats grama, little bluestem, and big bluestem make up 20 percent and blue grama and buffalograss make up 10 percent. Forbs, such as heath aster, prairie coneflower, yarrow, sageworts, false-boneset, and scarlet globemallow, make up about 5 percent.

The major management concern on this site is maintaining the extent of the productive plants. Green needlegrass, sideoats grama, little bluestem, and big bluestem rapidly lose their productive capacity after overgrazing because the livestock prefer these plants. Western wheatgrass initially increases in abundance after overgrazing, but if overgrazing continues, it decreases. After continued overgrazing, blue grama and buffalograss increase in abundance as the taller grasses decrease. The result is a less productive site of short grasses. The most productive grasses can be maintained by using the proper stocking rates along with a rotation grazing or a deferred grazing program that provides rest periods during the key growing seasons of the plants.

Claypan range site. The potential native vegetation on this site is mid and short prairie grasses interspersed with some forbs. Cool-season grasses make up about 65 percent of the vegetation. Specifically, western wheatgrass makes up about 45 percent; green

needlegrass, 15 percent; and needleandthread, 5 percent. Three cool-season grasses, blue grama, buffalograss, and sideoats grama, make up about 25 percent of the vegetation. Blue grama is the dominant cool-season grass. Sedges and forbs make up about 10 percent of the vegetation.

The major management concern on this site is maintaining the extent of the most productive plants. Green needlegrass, western wheatgrass, needleandthread, and sideoats grama rapidly lose their productive capacity after continued overgrazing because the livestock prefer these plants. As these grasses decrease in abundance, blue grama and buffalograss increase. The result is less forage production. The most productive grasses can be maintained by using the proper stocking rates along with a rotation grazing or a deferred grazing program that provides rest periods during the key growing seasons of the plants.

Closed Depression range site. The potential native vegetation on this site is dominantly western wheatgrass and sedges. Western wheatgrass makes up about 85 percent of the vegetation, and sedges make up about 10 percent. The plant community is not stable because of wet and dry cycles. This site occurs on the flat or concave bottoms of closed depressions. Thus, it is excessively wet or ponded during wet periods and droughty during abnormally dry periods.

The major management concern on this site is maintaining the extent of the most productive plants. Continued overgrazing reduces the production of western wheatgrass, and trampling by livestock aggravates the poor drainage on the site. After overgrazing, short grasses, such as saltgrass and Kentucky bluegrass, increase in abundance as western wheatgrass decreases. The result is a less productive site. The most productive grasses can be maintained by using the proper stocking rates along with timely deferment of grazing that allows rest periods during the growing seasons of the desired plants and during the wet periods.

Dense Clay range site. The potential native vegetation on this site is mid prairie grasses interspersed with forbs. Two cool-season grasses, western wheatgrass and green needlegrass, make up about 90 percent of the vegetation. Forbs, such as wild onion, make up about 10 percent. This site does not have an understory of short grasses.

The major management concern on this site is maintaining the extent of green needlegrass and western wheatgrass. After continued overgrazing, these grasses decrease in abundance. As a result, the grasses are replaced by invaders or the soil becomes bare of vegetation. The unvegetated areas are highly susceptible to erosion. Green needlegrass and western wheatgrass can be maintained by using the proper stocking rates along with timely deferment of grazing or a rotation grazing program that provides rest periods during the key growing seasons of the grasses.

Limy Subirrigated range site. The potential native vegetation on this site is a luxuriant stand of mid and tall grasses. Warm-season grasses are dominant and make up about 75 percent of the vegetation. Little bluestem is the dominant warm-season grass and makes up about 50 percent of the vegetation. Other warm-season grasses include big bluestem, sideoats grama, and switchgrass. These grasses make up about 25 percent of the vegetation. The remaining vegetation is made up of cool-season grasses, such as needlegrass and western wheatgrass, and forbs, such as western yarrow, goldenrod, and Maximilian sunflower.

The major management concern on this site is maintaining the extent of the most productive grasses. After continued overgrazing, little bluestem and big bluestem lose vigor and decrease in abundance as western wheatgrass and Kentucky bluegrass increase. After many years of overgrazing, saltgrass, foxtail barley, and forbs unpalatable to livestock may become abundant. The most productive grasses can be maintained by using the proper stocking rates along with a rotation grazing or a deferred grazing program that provides rest periods during the key growing seasons of these plants.

Overflow range site. The potential native vegetation on this site is mixed prairie grasses. Big bluestem, a tall, warm-season grass, makes up about 55 percent of the vegetation. Other tall and mid, warm-season grasses, such as switchgrass, indiangrass, little bluestem, and sideoats grama, make up about 20 percent of the vegetation. Green needlegrass and western wheatgrass, two cool-season grasses, make up about 20 percent of the vegetation, and leadplant and sedges make up about 5 percent.

The major management concern on this site is maintaining the extent of the productive plants. Big bluestem, switchgrass, green needlegrass, indiangrass, and little bluestem rapidly lose their productive capacity and decrease in abundance after overgrazing because the livestock prefer these plants. As these grasses decrease in abundance, western wheatgrass and sideoats grama initially increase. If overgrazing

continues, however, Kentucky bluegrass, a short, cool-season grass, increases in abundance and becomes the dominant plant on the site. The result is low forage production. The most productive grasses can be improved or maintained by using the proper stocking rates along with timely deferment of grazing or a rotation grazing program that provides rest periods during the key growing seasons of the desired plants.

Saline Lowland range site. The potential native vegetation on this site consists of salt-tolerant plants. Prairie cordgrass, western wheatgrass, and Nuttall alkaligrass make up about 70 percent of the vegetation. Alkali sacaton and switchgrass make up about 10 percent. Inland saltgrass, sedges, and forbs make up about 20 percent.

The major management concern on this site is maintaining the extent of the most productive plants. After continuous overgrazing, the most preferred and productive grasses lose vigor and decrease in abundance. As these grasses decrease in abundance, inland saltgrass increases and rapidly becomes the dominant grass on the site. Because inland saltgrass is unpalatable to livestock and has low productivity, the site then loses its capacity to produce quality forage. The most productive grasses can be maintained by using the proper stocking rates along with a rotation grazing or a deferred grazing program that provides rest periods during the key growing seasons of the plants.

Sandy range site. The potential native vegetation on this site is mixed prairie grasses. Three warm-season grasses, little bluestem, sand bluestem, and prairie sandreed, make up about 60 percent of the vegetation. Two cool-season grasses, needleandthread and western wheatgrass, make up about 20 percent. Sideoats grama and blue grama make up about 10 percent. Forbs, such as heath aster, scurfpea, and sagewort, also make up about 10 percent.

The major management concern on this site is maintaining the extent of the most productive grasses. Sand bluestem and little bluestem decrease in abundance after overgrazing because the livestock prefer these plants. As these grasses decrease in abundance, prairie sandreed, needleandthread, and sideoats grama initially increase. If overgrazing continues, these grasses decrease in abundance and are replaced by blue grama and Kentucky bluegrass. The result is low forage production. The most productive grasses can be improved or maintained by using the proper stocking rates along with timely deferment of grazing or a rotation grazing program that provides rest periods during the key growing seasons of the plants.

Shallow Marsh range site. This site is characterized by ponding during the spring and early summer. The potential native vegetation is water-tolerant, tall prairie grasses and sedges. Rivergrass and slough sedge are the dominant plants and make up about 75 percent of the vegetation. American mannagrass, common spikesedge, and prairie cordgrass make up about 15 percent. Forbs, such as smartweed and water plantain, make up about 10 percent.

The major management concern on this site is maintaining the extent of the productive plants. After continued overgrazing, rivergrass and slough sedge decrease in abundance and are replaced by spikesedge and other grasslike plants that are less palatable to livestock. The result is a loss of usable forage. The most productive plants can be maintained by using the proper stocking rates along with a rotation grazing program or timely deferment of grazing that allows rest periods during the key growing seasons of the plants.

Shallow to Gravel range site. The potential native vegetation on this site is mid prairie grasses. Cool-season grasses make up about 50 percent of the vegetation. Specifically, needleandthread makes up about 40 percent and western wheatgrass makes up about 10 percent. Warm-season grasses make up about 40 percent of the vegetation. Specifically, little bluestem, plains muhly, sideoats grama, and prairie dropseed make up about 20 percent and blue grama and hairy grama make up about 20 percent. Sedges, forbs, and shrubs make up about 10 percent.

The major management concern on this site is maintaining the extent of the most productive grasses. Needleandthread, western wheatgrass, little bluestem, plains muhly, sideoats grama, and prairie dropseed rapidly decrease in abundance after continuous overgrazing. As these grasses decrease in abundance, sedges, blue grama, and hairy grama increase. If overgrazing continues, the soil becomes bare of vegetation and the productivity of the site is greatly reduced. The most productive grasses can be maintained by using the proper stocking rates along with a rotation grazing program or a deferred grazing program that provides rest periods during the key growing seasons of the plants.

Silty range site. The potential native vegetation on this site is mixed prairie grasses. Cool-season grasses make up about 55 percent of the vegetation. Green needlegrass and western wheatgrass are the dominant cool-season grasses, and needleandthread and porcupinegrass are less dominant. Warm-season grasses, such as little bluestem, big bluestem, prairie dropseed, sideoats grama, and blue grama, make up

about 35 percent of the vegetation. Forbs, such as sagewort, heath aster, and false-boneset, and shrubs, such as leadplant, rose, and western snowberry, make up about 10 percent.

The major management concern on this site is maintaining the extent of the most productive grasses. Little bluestem, big bluestem, prairie dropseed, porcupinegrass, and green needlegrass decrease in abundance after overgrazing because the livestock prefer these plants. Western wheatgrass and needleandthread initially increase in abundance after overgrazing. If overgrazing continues, short grasses, such as blue grama and Kentucky bluegrass, become the dominant plants. The result is low forage production. The most productive grasses can be improved or maintained by using the proper stocking rates along with timely deferment of grazing or a rotation grazing program that provides rest periods during the key growing seasons of the desired plants.

Subirrigated range site. The potential native vegetation on this site is dominantly tall, warm-season grasses. Big bluestem is the dominant grass and makes up about 60 percent of the vegetation. Switchgrass, indiangrass, and little bluestem occur less extensively and make up about 20 percent of the vegetation. Western wheatgrass, sedges, and bluegrass make up about 10 percent of the vegetation. Forbs, such as Maximilian sunflower, snowy milkweed, and Missouri goldenrod, also make up about 10 percent.

The major management concern on this site is maintaining the extent of the most productive tall grasses. Big bluestem, indiangrass, and switchgrass decrease in abundance after overgrazing. As these grasses decrease in abundance, western wheatgrass, sedges, and Kentucky bluegrass increase. If overgrazing continues, Kentucky bluegrass, inland saltgrass, annual grasses, and weeds dominate the site. The result is very low forage production. The most productive tall grasses can be maintained by using the proper stocking rates along with a rotation grazing or a deferred grazing program that provides rest periods during the key growing seasons of the plants.

Thin Claypan range site. The potential native vegetation on this site is a mixture of mid and short grasses. Western wheatgrass is the dominant cool-season grass and makes up about 40 percent of the vegetation. Short, warm-season grasses, such as blue grama and buffalograss, also make up about 40 percent of vegetation. Inland saltgrass and sedges make up about 10 percent of the vegetation. Forbs, such as sagewort, heath aster, and brome snakeweed, also make up about 10 percent.

The major management concern on this site is maintaining the extent of western wheatgrass. After overgrazing, western wheatgrass decreases in abundance and is replaced by blue grama, buffalograss, prickly pear, and saltgrass. If overgrazing continues, considerable areas of soil become bare of vegetation, especially during dry cycles, and weeds become common during wet cycles. Western wheatgrass can be improved or maintained by using the proper stocking rates along with timely deferment of grazing that provides rest periods during the key growing seasons of the desired plants.

Thin Upland range site. The potential native vegetation on this site is mixed prairie grasses. Warm-season grasses dominate the site and make up about 70 percent of the vegetation. Specifically, little bluestem makes up about 40 percent; sideoats grama, big bluestem, and plains muhly, 20 percent; and blue grama, 10 percent. Cool-season grasses, such as green needlegrass, western wheatgrass, and needleandthread, make up about 20 percent of the vegetation. Forbs, such as pasqueflower and blacksamson, and woody plants, such as leadplant and rose, make up about 10 percent.

The major management concern on this site is maintaining the extent of the most productive grasses. Little bluestem, big bluestem, green needlegrass, and plains muhly lose their productive capacity and decrease in abundance after overgrazing because the livestock prefer these plants. As these grasses decrease in abundance, western wheatgrass, sideoats grama, and needleandthread initially increase. If overgrazing continues, short grasses, such as blue grama, increase in abundance and dominate the site. The result is low forage production. The most productive grasses can be improved or maintained by using the proper stocking rates along with timely deferment of grazing or a rotation grazing program that provides rest periods during the key growing seasons of the desired plants.

Very Shallow range site. The potential native vegetation on this site is mid and short grasses. Needleandthread is the dominant mid grass and makes up about 30 percent of the vegetation. Short grasses, such as blue grama and hairy grama, also make up about 30 percent. Other grasses, such as plains muhly, western wheatgrass, and red threeawn, make up about 15 percent. Sedges, such as threadleaf sedge, are important on this site and make up about 15 percent of the vegetation. Forbs, such as dotted gayfeather, blacksamson, and sagewort, and shrubs, such as

leadplant and small soapweed, make up about 10 percent.

The main management concern on this site is maintaining a good stand of grasses. After overgrazing, the site rapidly deteriorates to a stand of grama grasses, threadleaf sedge, and a few forbs unpalatable to livestock. If overgrazing continues, the stand of short grasses may decrease in abundance and much of the soil may become bare of vegetation and susceptible to erosion. A good cover of productive grasses can be maintained on this site by using the proper stocking rates along with timely deferment of grazing or a rotation grazing program that provides rest periods during the key growing seasons of the desired plants.

Wetland range site. The potential native vegetation on this site is grasses and sedges that can tolerate a seasonal high water table that rises above the surface for short periods during spring. Prairie cordgrass is the dominant grass and makes up about 60 percent of the vegetation. Other grasses and grasslike plants, such as reedgrass, reed canarygrass, switchgrass, Canada wildrye, and bluegrasses, generally make up less than 25 percent. Sedges and forbs make up about 10 percent.

The major management concern on this site is maintaining the extent of the most productive grasses. After continued overgrazing, the most productive grasses decrease in abundance. As these grasses decrease in abundance, sedges, rushes, Kentucky bluegrass, and inland saltgrass increase. These plants are shorter and generally less palatable to livestock. The result is low productivity. The most productive grasses can be improved or maintained by using the proper stocking rates along with a rotation grazing or a deferred grazing program that provides rest periods during the key growing seasons of the plants.

Wet Meadow range site. The potential native vegetation on this site is a luxuriant stand of sedges and mid or tall grasses. Sedges, such as wooly sedge, make up about 50 percent of the vegetation. Reedgrass, prairie cordgrass, and fowl bluegrass make up about 40 percent. Understory species, such as western wheatgrass, spikesedge, and rushes, and forbs, such as smartweed, asters, and milkweed, make up about 10 percent.

The major management concern on this site is maintaining the extent of the most productive plants. After continued overgrazing, the tall grasses and the sedges more palatable to livestock decrease in abundance. As these plants decrease in abundance, the less palatable sedges, spikesedge, and rushes increase and weedy grasses, such as foxtail barley, invade. The growth of the less palatable vegetation results in a loss of usable forage. The most productive plants can be maintained by using the proper stocking rates along with a rotation grazing program or timely deferment of grazing that allows rest periods during the key growing seasons of the plants.

Native Woodland, Windbreaks, and Environmental Plantings

Thomas A. Hurford, resource conservationist, Soil Conservation Service, helped prepare this section.

Native trees and shrubs grow on about 600 acres in Jerauld County. The soils that support trees and shrubs are not classified as woodland soils. They are classified as grassland soils because they formed under a grassland influence. Prior to the settlement of the county, periodic fires throughout the area prevented the widespread establishment of trees and shrubs. After settlement, fire-control measures were introduced and trees and shrubs became established in some areas.

Trees and shrubs commonly grow along the drainageways in the Wessington Hills, in areas of Betts and Ethan soils. They include peachleaf willow and plains cottonwood. Additional plant species that commonly grow in the higher areas on the side slopes along the drainageways are American elm, boxelder, bur oak, golden currant, buckthorn, gooseberry, leadplant, chokecherry, American plum, hackberry, staghorn sumac, buffaloberry, and western snowberry. These drainageways provide excellent habitat for wildlife.

Scattered individual plants or clumps of plants, including American elm, American plum, boxelder, and western snowberry, are common in areas of Bon soils on flood plains. Plains cottonwood, peachleaf willow, and sandbar willow commonly grow in areas adjacent to stream channels and less commonly grow on the margins of areas of depressional soils, such as Worthing, Plankinton, and Tetonka.

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely

spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens.

At the end of each description under the heading "Detailed Soil Map Units" and in the section "Interpretive Groups," which follows the tables at the back of this survey, the soil has been assigned to a windbreak suitability group. A windbreak suitability group is a distinctive group of soils that supports trees and shrubs having similar growth and survival rates if weather conditions are normal and the windbreak is properly managed. The relationship between the soils and the growth of trees and shrubs was ascertained during this survey. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the growth of trees and shrubs. Soil reaction, salt content, and a seasonal high water table also are important.

Group 1. These soils are well suited to woody plants. They are on foot slopes and high flood plains. They receive additional moisture from runoff and flooding. Some areas are subirrigated. All climatically suited trees and shrubs grow well on these soils.

This group mainly consists of very deep, somewhat poorly drained to well drained, loamy, silty, or clayey soils. Available water capacity is moderate or high. The soils that are fine sandy loam or loamy fine sand are subject to severe wind erosion. Typical soils of this group are Artesian, Bon, Onita, and Prosper.

Group 2. These soils are well suited to woody plants. They are on toe slopes and low flood plains. They receive additional moisture from runoff or have a seasonal high water table within the root zone. All climatically suited trees and shrubs grow well on these soils.

This group consists of very deep, poorly drained or somewhat poorly drained, sandy, silty, loamy, or clayey soils. Available water capacity is high. The soils that are sandy loam or loamy fine sand are subject to severe wind erosion. Typical soils of this group are Clamo, Crossplain, Fedora, and Lawet.

Group 3. These soils are well suited to woody plants. They are on back slopes. Except for those species that require abundant moisture, all climatically suited trees and shrubs grow well on these soils.

This group consists of very deep, well drained, loamy or silty soils. Available water capacity is moderate or high. The potential for water erosion ranges from slight on the nearly level soils to severe on the strongly sloping soils. The potential for wind erosion ranges from slight to severe. Typical soils of this group are Clarno, Davis, Davison, Eakin, Hand, Highmore, Homme, Houdek, Lane, and Ree.

Group 4. These soils are fairly well suited to woody plants. They are on summits and back slopes. Most of the climatically suited trees and shrubs grow well on these soils; however, maximum growth is not possible because root development is limited.

This group consists of moderately deep, deep, or very deep, moderately well drained or well drained, clayey soils or clayey soils that have a loamy or silty surface layer. Available water capacity is low or moderate in the more clayey soils and moderate or high in the silty and loamy soils. This group also includes soils that have accumulations of salts in the lower part of the subsoil. The clayey soils are subject to severe wind erosion. The moderately sloping and strongly sloping soils are subject to severe water erosion. Typical soils of this group are Beadle and Peno.

Group 5. These soils are well suited to woody plants. They are on shoulder slopes and back slopes. Except for those species that require abundant moisture, all climatically suited trees and shrubs grow well on these soils.

This group mainly consists of deep or very deep, well drained or somewhat excessively drained, loamy or sandy soils. Available water capacity generally is low or moderate. These soils are subject to severe or very severe wind erosion. A typical soil of this group is Henkin.

Group 6. These soils are poorly suited to woody plants. They are on summits, shoulder slopes, and back slopes. No trees or shrubs grow well on these soils. Plantings can be established, but optimum survival and growth should not be expected. Field windbreaks are not effective because of the slow growth rate of plants and their low height at maturity.

This group consists of well drained or somewhat excessively drained, silty or loamy soils. The soils are moderately deep to bedrock or are shallow or moderately deep to sand and gravel. Available water capacity is low or moderate. The moderately sloping and strongly sloping soils are subject to severe erosion. Typical soils of this group are Alwilda, Canning, Delmont, and Enet.

Group 7. These soils are poorly suited to woody plants. No trees or shrubs grow well on these soils. Coniferous trees and shrubs are better suited to these soils than deciduous trees and shrubs. Plantings can be established, but optimum survival and growth should not be expected. Field windbreaks are not effective because of the slow growth rate of plants and their low height at maturity.

This group consists of moderately deep, deep, or very deep, somewhat excessively drained or excessively drained, sandy soils. Available water capacity is very low or low. These soils are subject to very severe wind erosion. No soils in Jerauld County are in this group.

Group 8. These soils are poorly suited to woody plants. They are on shoulder slopes. No trees or shrubs grow well on these soils. Plantings can be established, but optimum survival and growth should not be expected. Field windbreaks are not effective because of the slow growth rate of plants and their low height at maturity.

This group consists of moderately deep, deep, or very deep, well drained, loamy or silty soils. The soils contain enough calcium carbonate at or near the surface to adversely affect the growth and survival of trees and shrubs. Available water capacity is moderate or high. These soils are subject to severe wind erosion and water erosion. Typical soils of this group are Ethan and Gettys.

Group 9. These soils are poorly suited to woody plants. They have a dense claypan in the subsoil and an excessive amount of salts in the lower part of the subsoil. They are on back slopes and foot slopes. No trees or shrubs grow well on these soils because of the dense claypan and the content of salts.

This group consists of deep or very deep, moderately well drained, silty or loamy soils. Available water capacity is low or moderate. Typical soils of this group are Dudley and Farmsworth.

Group 10. These soils generally are unsuited to woody plants. They are shallow to bedrock, very shallow to gravel, very saline, very alkaline, stony, or very wet. Specialized plantings for the establishment of wildlife habitat or recreational areas or for beautification may be made in some areas. The most favorable sites should be selected, and only those trees and shrubs that have the best potential to survive and grow should be planted.

The soils in this group have a wide range in texture, depth, drainage, available water capacity, permeability, and slope. The potential for water erosion and wind erosion ranges from slight to very severe. Typical soils of this group are Arlo, Baltic, Bullcreek, Durrstein Variant, Egas, Henkin Variant, Plankinton, Talmo, Tetonka, and Worthing soils; Betts and Ethan soils that have slopes of more than 15 percent and are stony; and Delmont, Gettys, and Peno soils that have slopes of more than 15 percent.

Additional information about planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Wildlife Habitat

Connie M. Vicuna, biologist, Soil Conservation Service, helped prepare this section.

Soils affect the kind and amount of vegetation and water that are available to wildlife for food and cover. Therefore, they also affect the distribution and abundance of wildlife species. An understanding of soil capabilities allows the wildlife manager to develop wildlife habitats through planting or maintaining desirable vegetation, promoting natural establishment of desirable plants, and providing suitable areas of water for fish and wildlife.

About half of Jerauld County remains native range. The range is interspersed with areas of cropland and wetland. As a result of this land use pattern, many wildlife species associated with the prairie remain common in the county. These species include mule deer, sharp-tailed grouse, prairie chickens, jackrabbit, prairie ducks, geese, prairie dogs, and many grassland songbirds. Pheasants, gray partridge, and white-tailed deer are common, especially in the areas of cropland.

Woody cover is available in the draws of the Wessington Hills, near wetlands, and along drainageways and streams. These wooded areas support small populations of fox squirrel and porcupine and are important as habitat for white-tailed deer. Many landowners also keep small populations of turkey. Although natural wooded areas are not abundant, they are extremely important for food and cover for many wildlife species.

Wetlands are common throughout the county. Potholes and flooded or ponded areas along streams and many natural waterways provide habitat for waterfowl and shore birds. These areas are also used by migrating sandhill cranes and occasionally by migrating whooping cranes. A flock of white pelicans inhabits Crow Lake. This lake also supports good populations of northern pike and bullheads. Other fishing opportunities are limited to private farm ponds.

Because of similarities in topography and in the ability to produce and maintain vegetation, soil associations provide some indication of actual and potential distribution and density of wildlife and their habitat. Land use and management have a primary influence on wildlife and often correlate with soil associations. The soil associations in Jerauld County are described under the heading "General Soil Map Units."

Individual soils have different potentials for the development and maintenance of wildlife habitat elements. Therefore, the soil affects the degree or extent to which wildlife habitat can be established or improved. In table 9, the soils of Jerauld County are rated according to their potential for providing specific elements of wildlife habitat. This information can be used in planning parks, wildlife areas, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining the habitat elements; and in determining the intensity of management needed for each habitat element. The ratings, described in the following paragraphs, indicate the ease of establishing or maintaining these elements.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element. The element can be established, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element are very severe and that unsatisfactory results can be expected. Establishing, improving, or maintaining the element is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Their primary use is as a source of food, although small grain crops also provide some nesting cover. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, sorghum, wheat, and oats.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Their primary uses are nesting cover and roosting cover. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are intermediate wheatgrass and alfalfa.

Native herbaceous plants are native or naturally established grasses and forbs, including weeds. They are used for food, nesting cover, and escape cover. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of native herbaceous plants are big bluestem, switchgrass, indiangrass, green needlegrass, sideoats grama, western wheatgrass, and goldenrod.

Planted trees and shrubs are trees and shrubs that require cultivation before and during establishment. They produce fruit, buds, twigs, bark, and foliage. They are important as a source of food, reproductive cover, winter cover, and escape cover. Soil properties and features that affect the growth of these trees and shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of planted trees and shrubs are green ash, plum, chokecherry, buffaloberry, Rocky Mountain juniper, and eastern redcedar.

Native coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Only eastern redcedar occurs regularly in the survey area.

Native shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are sumac, gooseberry, snowberry, and big sagebrush.

Wetland plants are annual or perennial wild herbaceous plants that grow on moist or wet sites. They are important as a source of food and reproductive cover. Soil properties and features that affect the growth of wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, cattail, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet. Others can be created by dams, levees, or other water-control structures. Soil properties and features that affect shallow water areas are depth to bedrock, wetness,

surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

Native deciduous trees and woody understory produce nuts or other fruit, buds, twigs, bark, and foliage. Besides providing a source of food, they are important as winter cover and escape cover. Soil properties and features that affect the growth of native deciduous trees are depth of the root zone, available water capacity, and wetness. Examples of these trees are elm, cottonwood, green ash, bur oak, willow, plum, and chokecherry.

Information about the management of habitat elements for specific wildlife species can be obtained from the local office of the Soil Conservation Service; the South Dakota Department of Game, Fish, and Parks; or the U.S. Fish and Wildlife Service.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to a very

firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, and shrinking and swelling can cause the movement of footings. A high water table, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, and flooding affect absorption of the effluent. Large stones interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, flooding, and large stones.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Reaction and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, subsidence of organic layers, and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by cropping systems, depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and

slope. The construction of a system is affected by large stones. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, and large stones affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, and slope affect the construction of grassed waterways. A hazard of wind erosion, a low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the establishment, growth, and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

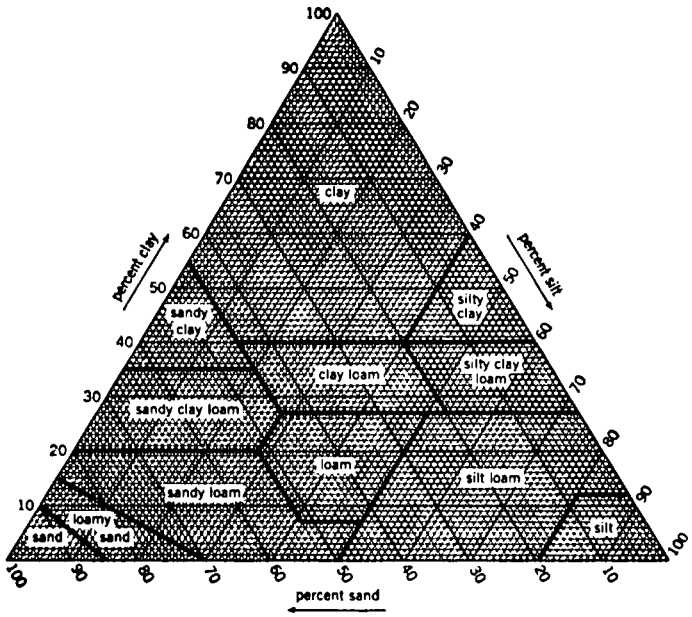

Figure 8.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 8). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering

properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design and management of irrigation systems, in the development of nutrient and pesticide management plans, in the design of soil drainage systems, and in the design of septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown, in the selection of a tillage system, in the decision on how to manage residue, and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in selecting pesticides, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as

construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.
8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, the efficiency of pesticides, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep or very deep, well drained to excessively

drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep, deep, or very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 16, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be

needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(10)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll *(Ust*, meaning intermittent dryness, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplustolls *(Hapl*, meaning minimal horizonation, plus *ustoll*, the suborder of the Mollisols that has an ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Haplustolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying layer can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(8)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(10)*. Unless otherwise stated, matrix colors in the descriptions are for dry soil. Colors for mottles, however, are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alwilda Series

Depth class: Very deep
Drainage class: Somewhat excessively drained

Permeability: Rapid
Landform: Outwash plains
Parent material: Outwash
Slope: 0 to 2 percent

Typical Pedon

Alwilda loam, 720 feet east and 2,600 feet north of the southwest corner of sec. 14, T. 108 N., R. 63 W.

Ap—0 to 7 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, friable; neutral; abrupt smooth boundary.

Bw—7 to 20 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; soft, friable; neutral; gradual smooth boundary.

BC—20 to 29 inches; brown (10YR 5/3) loamy sand, very dark grayish brown (10YR 3/2) moist; weak medium and fine subangular blocky structure; soft, friable; neutral; clear smooth boundary.

2C1—29 to 47 inches; multicolored gravelly loamy sand; single grain; loose; 15 percent gravel by volume; slight effervescence; moderately alkaline; gradual wavy boundary.

2C2—47 to 60 inches; multicolored gravelly sand; single grain; loose; about 20 percent gravel by volume; slight effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 15 to 20 inches
Depth to carbonates: 20 to 36 inches
Depth to a contrasting or impervious layer: 20 to 36 inches
Other characteristics: Below a depth of 20 inches, material that is dark but has less than 0.6 percent organic carbon

Arlo Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate in the upper part and rapid in the underlying gravelly material
Landform: Outwash plains
Parent material: Outwash
Slope: 0 to 2 percent

Typical Pedon

Arlo loam, 950 feet north and 42 feet east of the southwest corner of sec. 15, T. 108 N., R. 64 W.

A—0 to 7 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine granular; soft, friable; common fine roots; strong effervescence (10 percent calcium carbonate); moderately alkaline; gradual wavy boundary.

Bk1—7 to 12 inches; gray (10YR 5/1) clay loam, dark gray (10YR 4/1) moist; few fine prominent reddish yellow (7.5YR 6/8) mottles; weak medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many medium and coarse accumulations of carbonate; violent effervescence (24 percent calcium carbonate); moderately alkaline; clear smooth boundary.

Bk2—12 to 18 inches; gray (10YR 5/1) sandy clay loam, very dark grayish brown (10YR 3/2) moist; few fine prominent reddish yellow (7.5YR 6/8) mottles; weak medium prismatic structure parting to moderate medium and fine subangular blocky; hard, firm, slightly sticky and slightly plastic; common fine roots; common fine to coarse accumulations of carbonate; strong effervescence (18 percent calcium carbonate); moderately alkaline; gradual smooth boundary.

Bkg—18 to 32 inches; light brownish gray (2.5Y 6/2) gravelly clay loam, grayish brown (2.5Y 5/2) moist; few fine prominent reddish yellow (7.5YR 6/8) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots; about 15 percent gravel; common fine dark accumulations and concretions (iron and manganese oxide); common fine to coarse accumulations of carbonate; strong effervescence (18 percent calcium carbonate); moderately alkaline; clear smooth boundary.

2Cg—32 to 60 inches; multicolored gravelly loamy sand; single grain; loose; about 40 percent gravel; common fine dark accumulations (iron and manganese oxide); strong effervescence (7 percent calcium carbonate); mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: Typically calcareous throughout
Depth to a contrasting or impervious layer: 20 to 40 inches
Other characteristics: An Ak horizon or a C horizon in some pedons; no free carbonates to a depth of 6 inches in some pedons in areas of native grasses

Artesian Series

Depth class: Very deep
Drainage class: Moderately well drained

Permeability: Slow
Landform: Fans
Parent material: Alluvium
Slope: 0 to 2 percent

Typical Pedon

Artesian silty clay, 1,300 feet north and 72 feet west of the southeast corner of sec. 13, T. 108 N., R. 65 W.

Ap—0 to 7 inches; dark gray (10YR 4/1) silty clay, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; strong effervescence; mildly alkaline; abrupt smooth boundary.

Bw—7 to 17 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, sticky and plastic; strong effervescence; mildly alkaline; abrupt wavy boundary.

Bky1—17 to 20 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, sticky and plastic; common dark gray (10YR 4/1) tongues; few intersecting slickensides; common fine nests of gypsum; common fine accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

Bky2—20 to 26 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate medium angular blocky; very hard, very firm, sticky and plastic; few intersecting slickensides; common dark gray (10YR 4/1) tongues; common fine and medium nests of gypsum; common fine accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

Cy—26 to 40 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky and plastic; common fine and medium nests of gypsum; few fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

C—40 to 60 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; massive; very hard, very firm, sticky and plastic; few fine and medium nests of gypsum; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 42 inches
Depth to carbonates: 0 to 16 inches

Baltic Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Clayey alluvium
Slope: 0 to 1 percent

Typical Pedon

Baltic silty clay, 50 feet south and 590 feet east of the northwest corner of sec. 26, T. 108 N., R. 64 W.

A—0 to 8 inches; very dark gray (5Y 3/1) silty clay, black (5Y 2.5/1) moist; moderate medium subangular blocky structure; very hard, very firm, sticky and plastic; common fine roots; thin layers of organic material at the surface; mildly alkaline; abrupt wavy boundary.

Bg1—8 to 14 inches; very dark gray (5Y 3/1) silty clay, black (5Y 2.5/1) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; very hard, very firm, sticky and plastic; common fine roots; strong effervescence; moderately alkaline; clear wavy boundary.

Bg2—14 to 26 inches; very dark gray (5Y 3/1) silty clay, black (5Y 2.5/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; common fine roots; common fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Bkg—26 to 39 inches; very dark gray (5Y 3/1) silty clay, black (5Y 2.5/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; common fine roots; common fine nests of gypsum and other salts; common fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

Czg1—39 to 46 inches; gray (5Y 5/1) silty clay, very dark gray (5Y 3/1) moist; massive; very hard, very firm, sticky and plastic; few fine roots; common fine nests of gypsum and other salts; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Czg2—46 to 60 inches; gray (5Y 5/1) silty clay, dark gray (5Y 4/1) moist; massive; very hard, very firm, sticky and plastic; few fine roots; common fine nests of gypsum and other salts; few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 50 inches
Depth to carbonates: 0 to 8 inches

Beadle Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Clayey glacial till
Slope: 0 to 6 percent

Typical Pedon

Beadle loam, in an area of Beadle-Jerauld-Dudley complex, 1 to 5 percent slopes, 202 feet east and 1,500 feet north of the southwest corner of sec. 33, T. 107 N., R. 64 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, friable; few pebbles; common fine roots; slightly acid; clear wavy boundary.

Bt1—5 to 11 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, firm, slightly sticky and slightly plastic; few pebbles; common fine roots; thin patchy shiny films on faces of peds; neutral; gradual smooth boundary.

Bt2—11 to 18 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; very hard, firm, sticky and plastic; few pebbles; common fine roots; thin patchy shiny films on faces of peds; mildly alkaline; clear smooth boundary.

Bk1—18 to 36 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure parting to moderate coarse and medium subangular blocky; very hard, firm, sticky and plastic; few pebbles; few fine roots; many fine and medium accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

Bk2—36 to 45 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; very hard, firm, sticky and plastic; few pebbles; few fine roots; many fine and medium accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C—45 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine prominent strong brown (7.5YR 5/8) mottles; massive; very hard, very firm, sticky and plastic; few pebbles; few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: 12 to 20 inches

Betts Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Moraines
Parent material: Glacial till
Slope: 6 to 40 percent

Typical Pedon

Betts stony loam, in an area of Betts-Ethan loams, 6 to 40 percent slopes, stony, 1,460 feet south and 110 feet east of the northwest corner of sec. 28, T. 108 N., R. 66 W.

A—0 to 2 inches; gray (10YR 5/1) stony loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable; common pebbles and stones; common fine roots; strong effervescence; mildly alkaline; abrupt wavy boundary.

Bw—2 to 6 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few pebbles; common fine roots; few fine accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

BCk—6 to 22 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; few fine prominent strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few pebbles; common fine roots; common fine accumulations of carbonate; strong effervescence; moderately alkaline; diffuse wavy boundary.

C—22 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine prominent strong brown (7.5YR 5/8) and distinct light gray (N 7/0) mottles; massive; hard, firm, slightly sticky and slightly plastic; few pebbles; few

fine roots; few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to carbonates: 0 to 3 inches
Other characteristics: As much as 20 percent, by volume, stones throughout some pedons

Bon Series

Depth class: Very deep
Drainage class: Well drained and moderately well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Loamy alluvium
Slope: 0 to 2 percent

Typical Pedon

Bon loam, 138 feet east and 1,320 feet north of the southwest corner of sec. 5, T. 106 N., R. 64 W.

A1—0 to 2 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak fine granular structure; soft, friable; many fine roots; neutral; clear smooth boundary.

A2—2 to 10 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak medium and fine subangular blocky structure; slightly hard, friable; common fine roots; neutral; clear smooth boundary.

Bw1—10 to 18 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable; common fine roots; mildly alkaline; clear smooth boundary.

Bw2—18 to 33 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable; common fine roots; common fine accumulations of carbonate; strong effervescence; mildly alkaline; clear smooth boundary.

Bw3—33 to 40 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; slightly hard, firm; common fine roots; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Bk—40 to 52 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; common fine distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; slightly hard, firm; common fine roots; common fine and medium accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

Bky—52 to 57 inches; dark grayish brown (2.5Y 4/2) loam, very dark grayish brown (2.5Y 3/2) moist; common fine distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; very hard, firm; few fine roots; common medium nests of gypsum; common fine to coarse accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C—57 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct strong brown (7.5YR 5/8) mottles; massive; very hard, firm; few fine roots; few fine nests of gypsum; common fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 50 inches
Depth to carbonates: 0 to 20 inches

Bullcreek Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landform: Fans
Parent material: Alluvium
Slope: 0 to 2 percent

Typical Pedon

Bullcreek clay, in an area of Artesian-Bullcreek complex, 1,900 feet south and 105 feet west of the northeast corner of sec. 24, T. 108 N., R. 65 W.

A—0 to 4 inches; dark gray (5Y 4/1) clay, very dark gray (5Y 3/1) moist; very thin gray (5Y 6/1) crust; weak coarse subangular blocky structure parting to weak fine subangular blocky; extremely hard, very firm, very sticky and very plastic; common fine roots; moderately alkaline; clear wavy boundary.

Bss—4 to 9 inches; dark gray (5Y 4/1) clay, dark olive gray (5Y 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; extremely hard, very firm, very sticky and very plastic; common fine roots; few intersecting slickensides; few fine accumulations of carbonate; strong effervescence; strongly alkaline; clear wavy boundary.

Bkssz—9 to 16 inches; gray (5Y 5/1) clay, olive gray (5Y 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; extremely hard, very firm, very sticky and very

plastic; common fine roots; few dark gray (5Y 4/1) tongues; few intersecting slickensides; common fine accumulations of salts; common fine accumulations of carbonate; strong effervescence; strongly alkaline; clear wavy boundary.

Cz1—16 to 30 inches; gray (5Y 5/1) clay, olive gray (5Y 4/2) moist; massive; extremely hard, very firm, very sticky and very plastic; few fine roots; few dark gray (5Y 4/1) tongues; common fine accumulations of salts; few fine accumulations of carbonate; strong effervescence; strongly alkaline; gradual wavy boundary.

Cz2—30 to 60 inches; light olive gray (5Y 6/2) clay, olive (5Y 4/2) moist; massive; extremely hard, very firm, very sticky and very plastic; common fine accumulations of salts; few fine accumulations of carbonate; strong effervescence; strongly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 0 to 10 inches

Canning Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part and rapid in the underlying gravelly material
Landform: Outwash plains
Parent material: Outwash
Slope: 0 to 6 percent

Typical Pedon

Canning loam, in an area of Ree-Canning loams, 0 to 2 percent slopes, 175 feet north and 600 feet west of the southeast corner of sec. 9, T. 107 N., R. 67 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; hard, friable; few pebbles; neutral; abrupt smooth boundary.

Bt—7 to 16 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; moderate coarse and medium prismatic structure parting to moderate coarse and medium subangular blocky; very hard, firm, slightly sticky and slightly plastic; few pebbles; few shiny films on faces of peds; neutral; gradual wavy boundary.

Btk—16 to 26 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate coarse and medium prismatic structure parting to moderate coarse and medium subangular blocky; very hard, firm, slightly sticky and slightly plastic; few pebbles; shiny films on faces of peds; common fine accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

Bk—26 to 33 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; slightly hard, friable; few pebbles; common fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

C—33 to 60 inches; multicolored gravelly sand; single grain; loose; about 45 percent gravel; strong effervescence; mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 16 inches
Depth to carbonates: 12 to 25 inches
Depth to a contrasting or impervious layer: 20 to 40 inches

Clamo Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Clayey alluvium
Slope: 0 to 1 percent

Typical Pedon

Clamo silty clay loam, 1,000 feet north and 365 feet west of the southeast corner of sec. 4, T. 107 N., R. 64 W.

A—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate fine subangular blocky structure; hard, firm; many fine roots; neutral; clear smooth boundary.

Bw1—8 to 17 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm; common fine roots; neutral; clear wavy boundary.

Bw2—17 to 22 inches; very dark gray (N 3/0) silty clay, black (N 2/0) moist; moderate coarse and medium prismatic structure parting to moderate coarse and medium subangular blocky; hard, very firm, sticky and plastic; common fine roots; strong effervescence; mildly alkaline; clear wavy boundary.

Bk—22 to 30 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark gray (N 3/0) moist; moderate coarse and medium prismatic structure parting to moderate coarse and medium subangular blocky; hard, very firm, sticky and plastic; common fine roots; common fine and medium accumulations of carbonate;

strong effervescence; mildly alkaline; clear wavy boundary.

Bkz—30 to 40 inches; dark gray (N 4/0) silty clay, black (N 2/0) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; very hard, very firm, sticky and plastic; common fine roots; common fine nests of salts; common fine accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

Cg1—40 to 47 inches; gray (5Y 5/1) clay loam, dark gray (5Y 4/1) moist; common fine distinct strong brown (7.5YR 5/8) mottles; massive; very hard, very firm, very sticky and very plastic; few fine roots; common fine dark accumulations (iron and manganese oxide); few fine nests of salts; common fine and few medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

Cg2—47 to 60 inches; olive gray (5Y 5/2) clay loam, dark olive gray (5Y 3/2) moist; common fine distinct strong brown (7.5YR 5/8) mottles; massive; very hard, very firm, very sticky and very plastic; few fine roots; common fine dark accumulations (iron and manganese oxide); few fine nests of salts; common fine and few medium accumulations of carbonate; strong effervescence; mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 48 inches
Depth to carbonates: 14 to 30 inches

Clarno Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 9 percent

Typical Pedon

Clarno loam, in an area of Clarno-Ethan-Prosper loams, 1 to 5 percent slopes, 2,578 feet south and 850 feet east of the northwest corner of sec. 28, T. 107 N., R. 63 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine subangular blocky structure parting to weak fine granular; slightly hard, friable; few pebbles; neutral; abrupt smooth boundary.

Bw—7 to 14 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few pebbles; mildly alkaline; clear wavy boundary.

Bk1—14 to 20 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable; few pebbles; few fine accumulations of carbonate; mildly alkaline; gradual wavy boundary.

Bk2—20 to 39 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; few fine distinct reddish yellow (7.5YR 6/8) relic mottles; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, friable; few pebbles; common fine and medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

Cy—39 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; common fine distinct reddish yellow (7.5YR 6/8) and faint light gray (10YR 7/1) mottles; massive; hard, friable; few pebbles; common fine and medium accumulations of gypsum; few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 20 inches
Depth to carbonates: 12 to 22 inches

Crossplain Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 2 percent

Typical Pedon

Crossplain loam, in an area of Plankinton-Crossplain complex, 1,428 feet north and 2,440 feet east of the southwest corner of sec. 36, T. 107 N., R. 64 W.

Ap—0 to 8 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, friable; slightly acid; abrupt smooth boundary.

Bt1—8 to 16 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable; shiny films on faces of peds; slightly acid; clear smooth boundary.

Bt2—16 to 28 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; moderate medium and fine prismatic structure parting to strong medium subangular blocky; very hard, firm, slightly

sticky and slightly plastic; shiny films on faces of peds; slightly acid; clear smooth boundary.

Bkg—28 to 43 inches; light gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) moist; common fine prominent reddish yellow (7.5YR 6/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few accumulations (iron and manganese oxide); common fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

Cg—43 to 60 inches; light gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) moist; common fine faint white (N 8/0) and common fine and medium prominent reddish yellow (7.5YR 6/6) mottles; weak coarse and medium subangular blocky structure; soft, friable; few accumulations (iron and manganese oxide); few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 12 to 36 inches
Depth to carbonates: 16 to 48 inches

Davis Series

Depth class: Very deep
Drainage class: Well drained and moderately well drained
Permeability: Moderate
Landform: Fans
Parent material: Alluvium
Slope: 0 to 9 percent

Typical Pedon

Davis loam, 2 to 9 percent slopes, 800 feet north and 1,050 feet west of the southeast corner of sec. 31, T. 107 N., R. 67 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable; neutral; clear smooth boundary.

Bw1—9 to 22 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable; neutral; gradual wavy boundary.

Bw2—22 to 34 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak medium prismatic structure parting to weak medium and fine subangular blocky; soft, very friable; mildly alkaline; clear wavy boundary.

Bk1—34 to 42 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, friable; few fine accumulations of carbonate; slight effervescence; mildly alkaline; gradual wavy boundary.

Bk2—42 to 56 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Bk3—56 to 60 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; slightly hard, friable; common fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 60 inches
Depth to carbonates: 20 to 45 inches
Other characteristics: A C horizon in some pedons

Davison Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 2 percent

Typical Pedon

Davison loam, 680 feet north and 155 feet west of the southeast corner of sec. 2, T. 107 N., R. 64 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; few fine accumulations of carbonate; strong effervescence (7 percent calcium carbonate); mildly alkaline; abrupt smooth boundary.

Bk—10 to 18 inches; grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) and grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; many fine accumulations of carbonate; violent effervescence (20 percent calcium carbonate); moderately alkaline; gradual wavy boundary.

Cy1—18 to 32 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) and grayish

brown (2.5Y 5/2) moist; common fine distinct white (N 8/0) and reddish yellow (7.5YR 6/6) mottles; weak coarse subangular blocky structure; hard, friable; common fine nests of gypsum; few fine accumulations of carbonate; strong effervescence (13 percent calcium carbonate); moderately alkaline; clear wavy boundary.

Cy2—32 to 42 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct white (N 8/0) and reddish yellow (7.5YR 6/6) mottles; massive; hard, very friable; common fine nests of gypsum; few fine accumulations of carbonate; strong effervescence (8 percent calcium carbonate); moderately alkaline; gradual wavy boundary.

C1—42 to 54 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, grayish brown (2.5Y 5/2) moist; common fine distinct white (N 8/0) and reddish yellow (7.5YR 6/6) mottles; massive; slightly hard, very friable; few fine nests of gypsum; strong effervescence (5 percent calcium carbonate); moderately alkaline; clear wavy boundary.

C2—54 to 60 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; common fine distinct white (N 8/0) and reddish yellow (7.5YR 6/6) mottles; massive; hard, firm, sticky and plastic; few fine nests of gypsum; strong effervescence (5 percent calcium carbonate); moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 15 inches
Other characteristics: Carbonates typically at the surface; carbonates leached to a depth of 6 inches in some pedons in areas of native grasses

Delmont Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderate in the upper part and rapid in the underlying gravelly material
Landform: Outwash plains and moraines
Parent material: Outwash
Slope: 0 to 20 percent

Typical Pedon

Delmont loam, in an area of Enet-Delmont loams, 2 to 6 percent slopes, 180 feet south and 57 feet west of the northeast corner of sec. 34, T. 107 N., R. 63 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine granular structure; soft, friable; few pebbles; mildly alkaline; abrupt smooth boundary.

Bw—8 to 15 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few pebbles; mildly alkaline; abrupt wavy boundary.

Bk—15 to 19 inches; multicolored gravelly sand; single grain; loose; about 45 percent gravel; coatings of carbonate on underside of pebbles; strong effervescence; mildly alkaline; clear wavy boundary.

2C—19 to 60 inches; multicolored gravelly sand; single grain; loose; about 45 percent gravel; slight effervescence; mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: 14 to 20 inches
Depth to a contrasting or impervious layer: 14 to 20 inches

Dudley Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 6 percent

Typical Pedon

Dudley silt loam, in an area of Houdek-Dudley complex, 0 to 3 percent slopes, 206 feet west and 77 feet north of the southeast corner of sec. 20, T. 108 N., R. 65 W.

A—0 to 4 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak thin platy structure parting to moderate medium granular; soft, very friable; common fine roots; slightly acid; clear wavy boundary.

E—4 to 6 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure parting to weak fine granular; soft, very friable; common fine roots; slightly acid; clear wavy boundary.

Btn1—6 to 10 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; strong coarse and medium columnar structure parting to strong medium subangular blocky; extremely hard, very firm, sticky and plastic; common fine roots; shiny films on faces of peds; mildly alkaline; clear wavy boundary.

Btn2—10 to 21 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong coarse prismatic structure parting to strong medium subangular blocky; extremely hard, very firm, sticky and plastic; common fine roots;

shiny films on faces of peds; mildly alkaline; clear wavy boundary.

Bkz1—21 to 28 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable; few fine roots; common fine accumulations of salts; few fine accumulations of carbonate; strong effervescence; strongly alkaline; gradual wavy boundary.

Bkz2—28 to 45 inches; pale olive (5Y 6/3) clay loam, olive (5Y 4/3) moist; weak coarse subangular blocky structure; hard, friable; few fine roots; few pebbles; common fine accumulations of salts; common fine accumulations of carbonate; strong effervescence; strongly alkaline; gradual wavy boundary.

C—45 to 60 inches; pale olive (5Y 6/3) clay loam, olive (5Y 4/3) moist; massive; hard, friable; few fine roots; few pebbles; common fine accumulations of salts; few fine accumulations of carbonate; strong effervescence; strongly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 16 to 35 inches
Thickness of the surface soil: 5 to 11 inches
Depth to salts: 16 to 40 inches

Durrstein Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 1 percent

Typical Pedon

Durrstein silt loam, 1,310 feet south and 75 feet east of the northwest corner of sec. 22, T. 108 N., R. 64 W.

E—0 to 1 inch; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak thin platy structure parting to weak fine granular; slightly hard, very friable; common fine roots; neutral; abrupt smooth boundary.

Btn1—1 to 3 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; moderate fine columnar structure parting to moderate fine subangular blocky; very hard, very firm, sticky and plastic; common fine roots; coatings of E horizon material on top and sides of columns; shiny films on faces of peds; mildly alkaline; clear wavy boundary.

Btn2—3 to 9 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; common fine roots; shiny films on faces of peds; moderately alkaline; clear wavy boundary.

Btknz—9 to 16 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, very firm, sticky and plastic; common fine roots; shiny films on faces of peds; common fine accumulations of salts; few fine accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

Bkz—16 to 32 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, very firm, sticky and plastic; few fine roots; common fine and few medium accumulations of salts; common fine accumulations of carbonate; strong effervescence; strongly alkaline; diffuse wavy boundary.

Czg1—32 to 43 inches; gray (5Y 5/1) silty clay loam, dark gray (5Y 4/1) moist; few fine distinct strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; common fine and medium nests of gypsum and other salts; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Czg2—43 to 50 inches; light olive gray (5Y 6/2) silty clay loam, olive gray (5Y 4/2) moist; few fine distinct strong brown (7.5YR 5/8) mottles; massive; very hard, firm, slightly sticky and slightly plastic; common fine and medium nests of gypsum and other salts; few fine dark accumulations (iron and manganese oxide); few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Cg—50 to 60 inches; olive gray (5Y 5/2) silty clay loam, olive gray (5Y 4/2) moist; few fine distinct strong brown (7.5YR 5/8) mottles; massive; very hard, firm, slightly sticky and slightly plastic; few fine dark accumulations (iron and manganese oxide); few fine accumulations of salts; few fine and medium accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the E horizon: 1 to 4 inches
Depth to salts: 5 to 12 inches

Durrstein Variant

Depth class: Very deep
Drainage class: Somewhat poorly drained

Permeability: Slow
Landform: Fans
Parent material: Alluvium
Slope: 0 to 1 percent

Typical Pedon

Durrstein Variant silt loam, in an area of Durrstein Variant-Artesian complex, 700 feet west and 1,780 feet south of the northeast corner of sec. 2, T. 108 N., R. 65 W.

E—0 to 3 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak thin platy structure; soft, very friable; common fine roots; neutral; abrupt wavy boundary.

Btn1—3 to 5 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium columnar structure; very hard, very firm, very sticky and very plastic; common fine roots; coatings of gray silt loam on faces of peds; mildly alkaline; clear wavy boundary.

Btn2—5 to 13 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; few fine roots; shiny films on faces of peds; slight effervescence; moderately alkaline; clear wavy boundary.

Btknz—13 to 21 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; few fine roots; shiny films on faces of peds; common fine and medium accumulations of salts and carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

Bkz—21 to 36 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; very hard, very firm, very sticky and very plastic; few fine roots; many fine and medium accumulations of salts and carbonate; strong effervescence; strongly alkaline; gradual wavy boundary.

C—36 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine prominent strong brown (7.5YR 5/8) mottles; massive; very hard, very firm, very sticky and very plastic; few fine roots; common fine and medium accumulations of salts and carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to carbonates: 6 to 16 inches
Thickness of the surface soil: 1 to 5 inches
Depth to salts: 6 to 16 inches

E horizon:
Color—value of 5 to 7 (3 to 5 moist), chroma of 1 or 2

Bt horizon:
Color—hue of 10YR or 2.5Y, value of 3 to 5 (2 or 3 moist), chroma of 1 or 2
Texture—clay, clay loam, or silty clay

Bkz horizon:
Color—hue of 10YR, 2.5Y, or 5Y, value of 3 to 6 (2 to 4 moist), chroma of 1 to 3
Texture—clay, clay loam, silty clay, or silty clay loam

C horizon:
Color—hue of 2.5Y or 5Y, value of 5 to 7 (4 to 6 moist), chroma of 1 to 4
Texture—clay loam, silty clay loam, silty clay, or clay

Eakin Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Silty glacial till over loamy glacial till
Slope: 2 to 6 percent

Typical Pedon

Eakin silt loam, in an area of Eakin-Ethan-Onita complex, 2 to 6 percent slopes, 75 feet west and 2,560 feet south of the northeast corner of sec. 30, T. 107 N., R. 66 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; slightly hard, very friable; neutral; abrupt smooth boundary.

Bt—7 to 15 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to moderate coarse and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; patchy shiny films on faces of peds; neutral; clear wavy boundary.

Bk1—15 to 21 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse and medium prismatic structure parting to weak coarse subangular blocky; hard, friable; common fine and medium accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Bk2—21 to 39 inches; light brownish gray (2.5Y 6/2)

silty clay loam, grayish brown (2.5Y 5/2) moist; common fine prominent reddish yellow (7.5YR 6/6) relic mottles; weak coarse and medium prismatic structure parting to weak coarse subangular blocky; hard, friable; common fine and medium accumulations of carbonate; strong effervescence; moderately alkaline; diffuse wavy boundary.

2C—39 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; common fine prominent reddish yellow (7.5YR 6/6) relic mottles; massive; very hard, friable, sticky and plastic; few pebbles; common fine and medium dark reddish brown (5YR 3/2) concretions (iron and manganese oxide); few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 18 inches
Depth to carbonates: 10 to 18 inches

Egas Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 1 percent

Typical Pedon

Egas silty clay, in an area of Durrstein-Egas complex, 150 feet south and 2,598 feet west of the northeast corner of sec. 23, T. 107 N., R. 64 W.

Az—0 to 6 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; weak medium and fine subangular blocky structure; hard, very firm, very sticky and plastic; common fine roots; common fine to coarse accumulations of salts; moderately alkaline; clear wavy boundary.

Akz—6 to 12 inches; dark gray (2.5Y 4/1) silty clay, very dark gray (2.5Y 3/1) moist; weak coarse and medium subangular blocky structure; hard, very firm, very sticky and plastic; common fine roots; many fine to coarse accumulations of salts; common fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Akzg—12 to 17 inches; dark gray (5Y 4/1) silty clay, dark olive gray (5Y 3/2) crushing to olive gray (5Y 4/2) moist; weak coarse and medium subangular blocky structure; hard, very firm, very sticky and plastic; common fine roots; many fine to coarse accumulations of salts; common fine accumulations of carbonate; strong effervescence; strongly alkaline; clear wavy boundary.

ACkzg—17 to 34 inches; gray (5Y 6/1) silty clay, dark gray (5Y 4/1) moist; weak coarse subangular blocky structure; hard, very firm, very sticky and plastic; few fine roots; common tongues of A horizon material ¼ to 1 inch wide; many fine to coarse accumulations of salts; many fine and medium accumulations of carbonate; strong effervescence; strongly alkaline; gradual wavy boundary.

Cg1—34 to 41 inches; light olive gray (5Y 6/2) silty clay, gray (5Y 5/1) moist; massive; very hard, very firm, very sticky and plastic; few and common fine to coarse accumulations of salts; few and common fine to coarse accumulations of carbonate; strong effervescence; strongly alkaline; gradual wavy boundary.

Cg2—41 to 60 inches; olive gray (5Y 5/2) silty clay, olive gray (5Y 4/2) moist; massive; very hard, very firm, very sticky and plastic; few and common fine to coarse accumulations of salts; few and common fine to coarse accumulations of carbonate; strong effervescence; strongly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 24 inches
Depth to carbonates: 0 to 10 inches

Enet Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part and rapid in the underlying gravelly material (fig. 9)
Landform: Outwash plains
Parent material: Outwash
Slope: 0 to 6 percent

Typical Pedon

Enet loam, in an area of Enet-Delmont loams, 2 to 6 percent slopes, 160 feet north and 1,800 feet west of the southeast corner of sec. 24, T. 107 N., R. 63 W.

A—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak fine subangular blocky structure; slightly hard, friable; common fine roots; neutral; clear smooth boundary.

Bw1—7 to 14 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable; common fine roots; neutral; gradual smooth boundary.

Bw2—14 to 25 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist;

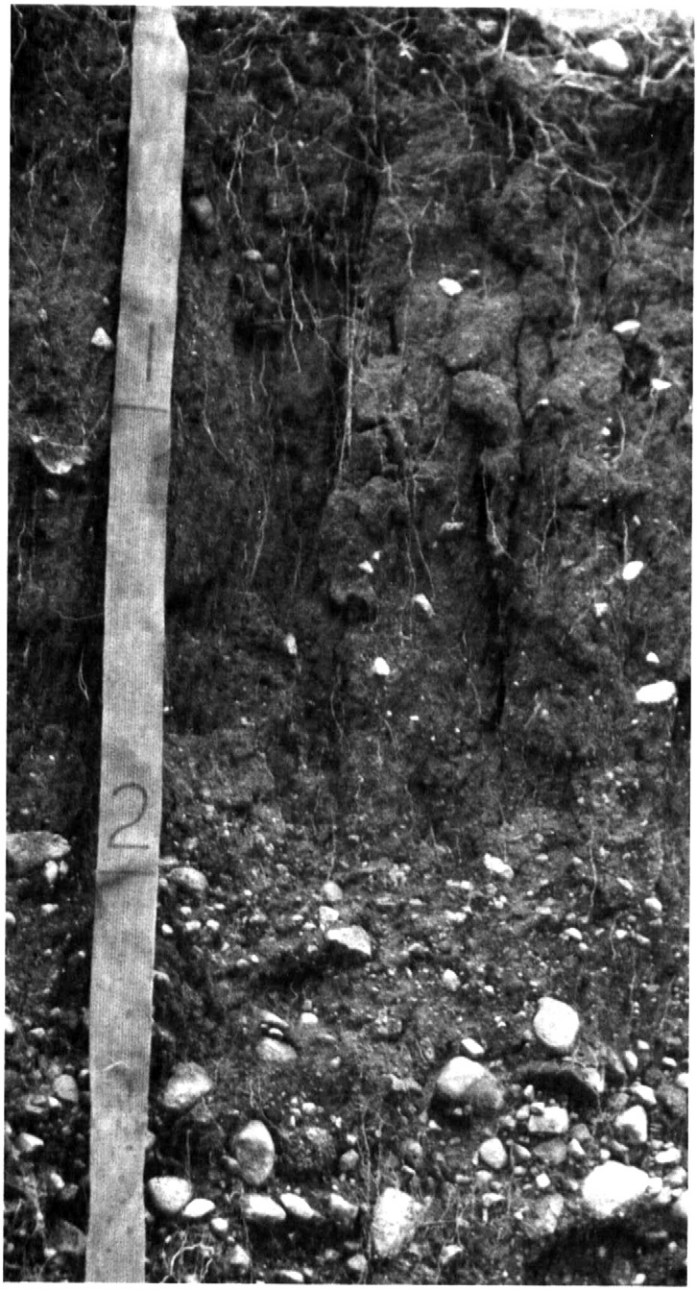

Figure 9.—Profile of Enet loam. Gravelly material is at a depth of about 2 feet. Depth is marked in feet.

weak medium prismatic structure parting to weak coarse subangular blocky; slightly hard, friable; common fine roots; neutral; gradual wavy boundary.

2C1—25 to 40 inches; brown (10YR 5/3) very gravelly loamy sand, dark brown (10YR 4/3) moist; single grain; loose; about 35 percent gravel; few fine roots; coatings of carbonate on undersides of gravel; strong effervescence; mildly alkaline; gradual wavy boundary.

2C2—40 to 60 inches; pale brown (10YR 6/3) gravelly sand, dark brown (10YR 4/3) moist; single grain; loose; about 40 percent gravel; few fine roots; strong effervescence; mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 20 to 40 inches
Depth to a contrasting or impervious layer: 20 to 40 inches

Ethan Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains and moraines
Parent material: Glacial till
Slope: 2 to 40 percent

Typical Pedon

Ethan loam, in an area of Clarno-Ethan-Prosper loams, 1 to 5 percent slopes, 185 feet south and 2,530 feet west of the northeast corner of sec. 28, T. 107 N., R. 63 W.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable; few pebbles; strong effervescence (8 percent calcium carbonate); mildly alkaline; abrupt smooth boundary.

Bk1—8 to 22 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, friable; few pebbles; common fine accumulations of carbonate; violent effervescence (15 percent calcium carbonate); moderately alkaline; gradual wavy boundary.

Bk2—22 to 37 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; common fine prominent strong brown (7.5YR 5/8) and common fine distinct white (N 8/0) relic mottles; weak medium subangular blocky structure; very hard, friable; few pebbles; common fine accumulations of carbonate; strong effervescence (12 percent calcium carbonate); moderately alkaline; gradual wavy boundary.

C—37 to 60 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; common fine prominent strong brown (7.5YR 5/8) and common fine distinct

white (N 8/0) relic mottles; massive; very hard, firm, slightly sticky and slightly plastic; few pebbles; few fine accumulations of carbonate; strong effervescence (7 percent calcium carbonate); moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 10 inches
Depth to carbonates: 0 to 5 inches

Farmsworth Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Fans
Parent material: Alluvium
Slope: 0 to 2 percent

Typical Pedon

Farmsworth silt loam, in an area of Farmsworth-Lane complex, 1,450 feet east and 420 feet south of the northwest corner of sec. 2, T. 107 N., R. 66 W.

A—0 to 8 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak fine granular structure; soft, friable; many fine roots; slightly acid; clear smooth boundary.

E—8 to 10 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak medium platy structure parting to weak fine granular; soft, friable; common fine roots; slightly acid; abrupt smooth boundary.

Btn1—10 to 13 inches; dark gray (10YR 4/1) clay, black (10YR 2/1) moist; moderate medium columnar structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; thin gray (10YR 5/1) coatings on top of columns; tops of columns break easily; common fine roots; shiny films on vertical faces of peds; neutral; clear smooth boundary.

Btn2—13 to 17 inches; dark gray (10YR 4/1) clay, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; shiny films on vertical faces of peds; common fine roots; mildly alkaline; clear wavy boundary.

Btnz—17 to 25 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; patchy shiny films on vertical faces of peds; few fine roots; common fine and medium accumulations of gypsum and other salts; mildly alkaline; gradual wavy boundary.

Bz—25 to 33 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; few fine roots; common fine and medium accumulations of gypsum and other salts; mildly alkaline; clear wavy boundary.

Bkz—33 to 50 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; few fine prominent reddish yellow (7.5YR 6/8) mottles; weak medium prismatic structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; few fine roots; common fine and medium accumulations of gypsum and other salts; common fine accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

C—50 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; few fine prominent reddish yellow (7.5Y 6/8) mottles; massive; very hard, firm, sticky and plastic; few fine roots; few fine accumulations of salts; few fine accumulations of carbonate; strong effervescence; mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 20 to 40 inches
Thickness of the surface soil: 5 to 12 inches
Depth to gypsum and other salts: 16 to 32 inches

Fedora Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderately rapid
Landform: Outwash plains
Parent material: Outwash
Slope: 0 to 2 percent

Typical Pedon

Fedora loam, 280 feet south and 2,627 feet west of the northeast corner of sec. 22, T. 107 N., R. 63 W.

A1—0 to 2 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure; soft, friable; common fine roots; neutral; abrupt smooth boundary.

A2—2 to 8 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; slightly hard, friable; common fine roots; strong effervescence (9 percent

calcium carbonate); strongly alkaline; clear wavy boundary.
Ak—8 to 11 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak coarse and medium subangular blocky structure; hard, friable; few fine roots; common fine accumulations of carbonate; strong effervescence (12 percent calcium carbonate); very strongly alkaline; clear wavy boundary.
Bk1—11 to 14 inches; gray (10YR 5/1) loam, dark gray (10YR 4/1) moist; weak coarse and medium subangular blocky structure; hard, friable; few fine roots; common fine and medium accumulations of carbonate; violent effervescence (16 percent calcium carbonate); very strongly alkaline; gradual wavy boundary.
Bk2—14 to 25 inches; light gray (10YR 6/1) sandy loam, gray (10YR 5/1) moist; weak coarse and medium subangular blocky structure; hard, friable; few fine roots; common fine accumulations of carbonate; violent effervescence (17 percent calcium carbonate); very strongly alkaline; clear wavy boundary.
C1—25 to 36 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; few fine faint yellowish brown (10YR 5/4) mottles; massive; hard, friable; few fine roots; few fine accumulations of carbonate; strong effervescence (6 percent calcium carbonate); very strongly alkaline; clear wavy boundary.
C2—36 to 60 inches; light brownish gray (2.5Y 6/2) loamy fine sand, grayish brown (2.5Y 5/2) moist; few fine faint yellowish brown (10YR 5/4) mottles; single grain; loose; few fine accumulations of carbonate; strong effervescence (2 percent calcium carbonate); moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 16 inches
Depth to carbonates: Calcareous throughout

Gettys Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Moraines
Parent material: Clayey glacial till
Slope: 6 to 20 percent

Typical Pedon

Gettys clay loam, in an area of Gettys-Peno complex, 9 to 20 percent slopes, 1,750 feet north and 68 feet east of the southwest corner of sec. 28, T. 107 N., R. 65 W.

A—0 to 4 inches; dark gray (10YR 4/1) clay loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, firm, slightly sticky and slightly plastic; common fine roots; neutral; clear wavy boundary.
Bk1—4 to 18 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; common fine distinct strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to weak coarse and medium subangular blocky; very hard, very firm, very sticky and very plastic; common fine roots; common fine and medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.
Bk2—18 to 28 inches; pale brown (10YR 6/3) clay loam, dark grayish brown (10YR 4/2) moist; common fine distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; very hard, very firm, very sticky and very plastic; few fine roots; common fine accumulations (iron and manganese oxide); common fine and medium accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.
C1—28 to 34 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; common fine distinct strong brown (7.5YR 5/8) mottles; massive; very hard, firm, sticky and plastic; few fine roots; common fine accumulations (iron and manganese oxide); few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.
C2—34 to 60 inches; grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) and grayish brown (2.5Y 5/2) moist; massive; very hard, very firm, very sticky and very plastic; few fine roots; common fine accumulations (iron and manganese oxide); few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to carbonates: At or within a few inches of the surface

Hand Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Till plains
Parent material: Loamy glacial till
Slope: 0 to 9 percent

Typical Pedon

Hand loam, in an area of Hand-Ethan-Prosper loams, 1 to 5 percent slopes, 900 feet north and 915 feet east of the southwest corner of sec. 36, T. 107 N., R. 63 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable; slightly acid; abrupt smooth boundary.

Bw—9 to 15 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; slightly hard, friable; neutral; abrupt wavy boundary.

Bk1—15 to 24 inches; light gray (10YR 7/1) loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, friable; many fine accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

Bk2—24 to 31 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, friable; common fine accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

C1—31 to 44 inches; light gray (2.5Y 7/2) silt loam, light brownish gray (2.5Y 6/2) moist; common fine strong brown (7.5YR 5/8) mottles; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

C2—44 to 60 inches; light gray (2.5Y 7/2) loam, light brownish gray (2.5Y 6/2) moist; common fine strong brown (7.5YR 5/8) mottles; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 20 inches
Depth to carbonates: 12 to 26 inches

Henkin Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Outwash plains
Parent material: Glaciofluvial sediments
Slope: 1 to 5 percent

Typical Pedon

Henkin loam, 1 to 5 percent slopes, 170 feet north and 1,596 feet west of the southeast corner of sec. 11, T. 107 N., R. 67 W.

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable; common fine roots; neutral; clear smooth boundary.

A2—7 to 12 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable; common fine roots; neutral; clear smooth boundary.

Bw1—12 to 19 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable; common fine roots; neutral; clear smooth boundary.

Bw2—19 to 36 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable; thin layers of loamy sand; common fine roots; few fine and medium pebbles; neutral; gradual smooth boundary.

Bw3—36 to 43 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; soft, very friable; common fine roots; few fine and medium pebbles; neutral; gradual smooth boundary.

Bk—43 to 60 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; soft, very friable; common fine roots; few fine and medium pebbles; common fine and medium accumulations of carbonate; strong effervescence; mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 18 to 50 inches
Other characteristics: A C horizon in some pedons

Henkin Variant

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Rapid
Landform: Moraines
Parent material: Glaciofluvial sediments
Slope: 6 to 40 percent

Typical Pedon

Henkin Variant sandy loam, 6 to 40 percent slopes, 1,008 feet north and 168 feet west of the southeast corner of sec. 25, T. 108 N., R. 67 W.

A—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure;

soft, very friable; common fine roots; slightly acid; clear wavy boundary.

AC—10 to 20 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 4/3) moist; weak coarse prismatic structure; soft, very friable; common fine roots; slightly acid; clear wavy boundary.

C1—20 to 36 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; single grain; loose; few fine roots; neutral; gradual wavy boundary.

C2—36 to 60 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; single grain; loose; few fine roots; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to carbonates: More than 40 inches in some pedons

A horizon:
Color—value of 4 or 5 (2 or 3 moist), chroma of 1 or 2

C horizon:
Color—value of 5 to 7 (4 to 6 moist), chroma of 2 to 4
Texture—loamy fine sand, loamy sand, or fine sand

Highmore Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Till plains
Parent material: Silty glacial till
Slope: 0 to 3 percent

Typical Pedon

Highmore silt loam, in an area of Highmore-Onita silt loams, 0 to 3 percent slopes, 600 feet west and 1,000 feet north of the southeast corner of sec. 9, T. 106 N., R. 67 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable; slightly acid; abrupt smooth boundary.

Bt1—7 to 13 inches; brown (10YR 4/3) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable; patchy shiny films on faces of peds; neutral; clear smooth boundary.

Bt2—13 to 16 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable; patchy shiny films on faces of peds; neutral; clear smooth boundary.

Bk1—16 to 20 inches; light yellowish brown (10YR 6/4) silty clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

Bk2—20 to 50 inches; very pale brown (10YR 7/4) silt loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable; common fine and medium accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C—50 to 60 inches; very pale brown (10YR 7/4) silt loam, yellowish brown (10YR 5/4) moist; common medium fine distinct reddish yellow (7.5YR 7/8) and strong brown (7.5YR 5/8) mottles; massive; slightly hard, friable; few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 9 to 20 inches
Depth to carbonates: 12 to 24 inches
Other characteristics: A 2C horizon in some pedons that is loam or clay loam glacial till and below a depth of 40 inches

Homme Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains and moraines
Parent material: Silty glacial till
Slope: 0 to 9 percent

Typical Pedon

Homme silty clay loam, in an area of Homme-Onita-Beadle complex, 0 to 2 percent slopes, 670 feet south and 990 feet west of the northeast corner of sec. 34, T. 108 N., R. 66 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; weak coarse subangular blocky structure parting to weak medium and fine granular; slightly hard, friable; medium acid; abrupt smooth boundary.

Bw1—8 to 17 inches; dark brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak medium and fine subangular blocky; hard, friable, sticky and plastic; thin patchy shiny films on faces of peds; neutral; clear wavy boundary.

Bw2—17 to 25 inches; light olive brown (2.5Y 5/4) silty

clay loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to strong medium blocky; very hard, firm, sticky and plastic; neutral; clear wavy boundary.

Bk—25 to 45 inches; pale brown (10YR 6/3) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate medium and fine blocky; very hard, firm, sticky and plastic; common fine and medium accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

2C—45 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm; few pebbles; common medium accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 15 to 34 inches
Depth to a contrasting or impervious layer: 25 to 55 inches to loam or clay loam glacial till

Houdek Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 9 percent

Typical Pedon

Houdek loam (fig. 10), in an area of Houdek-Ethan-Prosper loams, 2 to 9 percent slopes, 233 feet north and 1,700 feet west of the southeast corner of sec. 20, T. 107 N., R. 66 W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable; few pebbles; common fine roots; neutral; clear smooth boundary.

Bt—5 to 14 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse and medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few pebbles; shiny films on faces of peds; common fine roots; neutral; gradual wavy boundary.

Bk1—14 to 25 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse and medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few pebbles; common fine roots; very dark grayish brown (10YR 3/2) tongues on faces of peds in the upper 4 inches; common fine and medium accumulations of carbonate; strong effervescence;

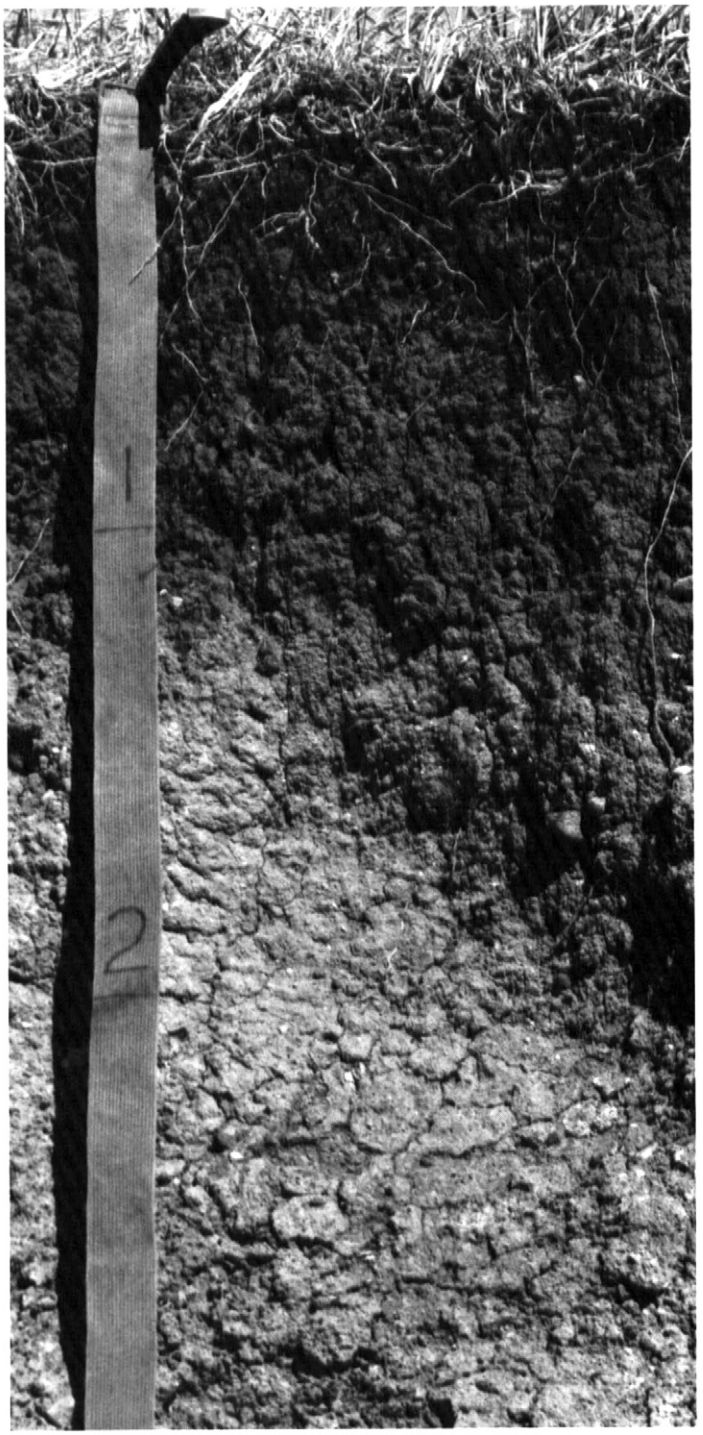

Figure 10.—Typical profile of Houdek loam. Calcium carbonate is at a depth of about 14 inches. Depth is marked in feet.

mildly alkaline; gradual wavy boundary.
Bk2—25 to 36 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; common fine prominent yellowish red (5YR 5/8) relic mottles; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few pebbles; common fine roots; common fine and medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.
C—36 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; common fine prominent yellowish red (5YR 5/8) relic mottles; massive; hard, firm, slightly sticky and slightly plastic; few pebbles; common fine roots; few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 20 inches
Depth to carbonates: 14 to 24 inches

Jerauld Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 5 percent

Typical Pedon

Jerauld loam, in an area of Houdek-Dudley-Jerauld complex, 2 to 6 percent slopes, 100 feet south and 310 feet east of the northwest corner of sec. 33, T. 108 N., R. 64 W.

E—0 to 3 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak thick platy structure parting to weak fine granular; hard, friable; common fine roots; neutral; abrupt smooth boundary.
Btn1—3 to 5 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium columnar structure; very hard, very firm, sticky and plastic; common fine roots; thin continuous gray (10YR 5/1) coatings on top of columns; moderately alkaline; abrupt smooth boundary.
Btn2—5 to 9 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; shiny films on faces of peds; common fine roots; moderately alkaline; clear wavy boundary.
Btnz—9 to 17 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate coarse and medium subangular blocky; very hard, very firm, sticky and plastic; shiny films on faces of peds; common fine roots; common fine accumulations of salts; moderately alkaline; clear wavy boundary.
Bkz1—17 to 21 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate coarse and medium subangular blocky; very hard, firm, sticky and plastic; few fine roots; common fine accumulations of salts; common fine accumulations of carbonate; slight effervescence; strongly alkaline; clear wavy boundary.
Bkz2—21 to 41 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common fine accumulations of salts; common fine and few medium accumulations of carbonate; strong effervescence; strongly alkaline; gradual wavy boundary.
C—41 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; few fine prominent yellowish red (5YR 5/8) mottles; massive; very hard, firm, sticky and plastic; common fine accumulations of salts; common fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to carbonates: 6 to 17 inches
Thickness of the E horizon: 1 to 5 inches
Depth to gypsum and other salts: 7 to 16 inches

Lane Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Fans
Parent material: Alluvium
Slope: 0 to 6 percent

Typical Pedon

Lane silty clay loam, 2,580 feet north and 1,445 feet west of the southeast corner of sec. 35, T. 108 N., R. 67 W.

Ap—0 to 8 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak coarse and medium subangular blocky structure parting to weak fine granular; hard, friable, slightly sticky and slightly

plastic; slightly acid; abrupt smooth boundary.
Bt1—8 to 12 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; very hard, very firm, very sticky and very plastic; shiny films on faces of peds; slightly acid; gradual wavy boundary.
Bt2—12 to 22 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; very hard, very firm, very sticky and very plastic; shiny films on faces of peds; neutral; abrupt wavy boundary.
Bt3—22 to 30 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; very hard, very firm, very sticky and plastic; shiny films on faces of peds; dark gray (10YR 4/1) tongues; strong effervescence; mildly alkaline; gradual wavy boundary.
Btk—30 to 39 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; very hard, very firm, very sticky and plastic; shiny films on faces of peds; common fine and few medium accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.
Bk—39 to 50 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; very hard, very firm, very sticky and plastic; common fine and few medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.
C—50 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; few fine accumulations of carbonate; strong effervescence; mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 36 inches
Depth to carbonates: 10 to 25 inches

Lawet Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 1 percent

Typical Pedon

Lawet loam, 80 feet north and 2,582 feet east of the southwest corner of sec. 31, T. 107 N., R. 67 W.

Ak—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, friable; many fine roots; violent effervescence (14 percent calcium carbonate); moderately alkaline; gradual smooth boundary.
ABk—7 to 14 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, friable; common fine roots; violent effervescence (17 percent calcium carbonate); moderately alkaline; clear wavy boundary.
Bk—14 to 24 inches; gray (10YR 6/1) loam, dark gray (10YR 4/1) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; slightly hard, firm; common fine roots; common fine accumulations of carbonate; violent effervescence (18 percent calcium carbonate); moderately alkaline; clear wavy boundary.
Akb—24 to 28 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; very hard, firm, slightly sticky and slightly plastic; common fine roots; common fine accumulations of carbonate; strong effervescence (20 percent calcium carbonate); moderately alkaline; abrupt wavy boundary.
C1—28 to 50 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; hard, friable; few fine roots; common fine dark brown (7.5YR 4/4) concretions (iron and manganese oxide); very thin lenses of loamy sand in the lower part; common fine accumulations of carbonate; strong effervescence (7 percent calcium carbonate); moderately alkaline; abrupt wavy boundary.
C2—50 to 55 inches; light brownish gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable; few fine roots; common fine to coarse strong brown (7.5YR 5/8) and dark brown (7.5YR 3/2) concretions (iron and manganese oxide); strong effervescence (5 percent calcium carbonate); moderately alkaline; abrupt wavy boundary.
C3—55 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky and plastic; few fine roots; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 24 inches
Depth to carbonates: At or within a few inches of the surface

Onita Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 6 percent

Typical Pedon

Onita silt loam, 0 to 3 percent slopes, 2,580 feet south and 72 feet west of the northeast corner of sec. 7, T. 107 N., R. 66 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; weak fine granular structure; slightly hard, friable; slightly acid; abrupt smooth boundary.

A—8 to 17 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; weak coarse subangular blocky structure parting to weak fine subangular blocky; slightly hard, friable; slightly acid; clear wavy boundary.

Bt—17 to 29 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate coarse and medium subangular; very hard, firm, sticky and plastic; shiny films on faces of peds; slightly acid; clear wavy boundary.

Btk—29 to 40 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate coarse and medium subangular blocky; very hard, firm, sticky and plastic; few fine accumulations of carbonate; mildly alkaline; gradual wavy boundary.

Bk1—40 to 50 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; few fine distinct strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; very hard, firm, sticky and plastic; few dark gray (10YR 4/1) tongues; common fine and medium accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

Bk2—50 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; common medium distinct dark brown (7.5YR 3/2) and few fine distinct strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; common fine and medium accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 24 to more than 40 inches
Other characteristics: A C horizon in some pedons

Peno Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains and moraines
Parent material: Clayey glacial till
Slope: 2 to 15 percent

Typical Pedon

Peno loam, in an area of Gettys-Peno complex, 9 to 20 percent slopes, 125 feet east and 1,840 feet north of the southwest corner of sec. 33, T. 107 N., R. 64 W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine and medium granular structure; slightly hard, friable; common fine roots; neutral; clear smooth boundary.

Bt—3 to 10 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate coarse and medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few pebbles; common fine roots; few shiny films on faces of peds; mildly alkaline; clear wavy boundary.

Btk—10 to 17 inches; gray (10YR 5/1) clay loam, dark gray (10YR 4/1) moist; moderate medium prismatic structure parting to moderate coarse and medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few pebbles; common fine roots; few shiny films on faces of peds; few dark grayish brown (10YR 4/2) tongues on faces of peds; common fine and few medium accumulations of carbonate; strong effervescence; mildly alkaline; gradual wavy boundary.

Bk1—17 to 27 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; few fine distinct light gray (10YR 7/1) and prominent yellowish red (5YR 5/8) mottles; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few pebbles; few fine roots; common fine and medium accumulations of carbonate; strong effervescence; mildly alkaline; clear wavy boundary.

Bk2—27 to 46 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist;

common fine distinct light gray (10YR 7/1) and prominent yellowish red (5YR 5/8) mottles; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few pebbles; few fine roots; common fine and medium accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C—46 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct light gray (10YR 7/1) and prominent yellowish red (5YR 5/8) mottles; massive; very hard, very firm, sticky and plastic; few pebbles; few fine roots; few fine accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 11 inches
Depth to carbonates: 6 to 11 inches

Plankinton Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 1 percent

Typical Pedon

Plankinton silt loam, 850 feet south and 245 feet west of the northeast corner of sec. 9, T. 108 N., R. 67 W.

A—0 to 5 inches; gray (10YR 5/1) silt loam, black (10YR 2/1) moist; weak thin platy structure parting to weak fine granular; soft, very friable; many fine roots; medium acid; clear wavy boundary.

E—5 to 9 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak thick medium and thin platy structure parting to weak fine granular; soft, very friable; common fine roots; medium acid; abrupt smooth boundary.

Bt1—9 to 28 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; common fine roots; few thin patchy light brownish gray (10YR 3/1) coatings on vertical faces of peds; thin shiny films on faces of peds; slightly acid; gradual smooth boundary.

Bt2—28 to 39 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; common fine roots; few thin patchy light brownish gray (10YR 6/2) coatings on vertical faces of peds; thin shiny films on faces of peds; neutral; gradual smooth boundary.

BC—39 to 50 inches; grayish brown (2.5Y 5/2) silty clay, dark gray (2.5Y 4/1) moist; moderate coarse prismatic structure parting to moderate coarse and medium subangular blocky; very hard, firm, very sticky and very plastic; few fine roots; few thin patchy light brownish gray (10YR 6/2) coatings on vertical faces of peds; few fine accumulations of salts; few fine accumulations of carbonate; slight effervescence; mildly alkaline; gradual smooth boundary.

C—50 to 60 inches; grayish brown (2.5Y 5/2) silty clay, dark gray (2.5Y 4/1) moist; few fine distinct reddish yellow (7.5YR 6/8) mottles; massive; very hard, firm, very sticky and very plastic; few fine roots; few fine accumulations of salts; few fine accumulations of carbonate; slight effervescence; mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 50 inches
Depth to carbonates: 24 to 50 inches

Prosper Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 3 percent

Typical Pedon

Prosper loam, in an area of Clarno-Prosper loams, 0 to 2 percent slopes, 1,680 feet north and 72 feet west of the southeast corner of sec. 26, T. 107 N., R. 64 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; weak fine and medium subangular blocky structure parting to weak fine granular; slightly hard, very friable; slightly acid; abrupt smooth boundary.

A—7 to 10 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; weak medium and fine subangular blocky structure; slightly hard, very friable; slightly acid; abrupt smooth boundary.

Bt1—10 to 15 inches; dark grayish brown (10YR 4/2) clay loam, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; thin patchy shiny films on faces of peds; neutral; gradual smooth boundary.

Bt2—15 to 23 inches; dark grayish brown (10YR 4/2)

clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; thin patchy shiny films on faces of peds; neutral; clear smooth boundary.

Btk—23 to 27 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few fine accumulations of carbonate; strong effervescence; mildly alkaline; abrupt smooth boundary.

Bk—27 to 41 inches; light yellowish brown (2.5Y 6/4) loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; many fine and few medium accumulations of carbonate; strong effervescence; moderately alkaline; gradual wavy boundary.

C—41 to 60 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; few fine faint light gray (10YR 7/1) and few fine distinct yellowish red (5YR 5/6) mottles; weak coarse prismatic structure; hard, friable, slightly sticky and slightly plastic; common fine and few medium accumulations of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 40 inches
Depth to carbonates: 20 to 40 inches

Ree Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Outwash plains
Parent material: Outwash
Slope: 0 to 6 percent

Typical Pedon

Ree loam, in an area of Ree-Canning loams, 0 to 2 percent slopes, 220 feet south and 2,440 feet east of the northwest corner of sec. 16, T. 107 N., R. 67 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable; common fine roots; slightly acid; clear smooth boundary.

Bt1—5 to 8 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable; common fine roots; thin patchy shiny films on faces of peds; neutral; abrupt smooth boundary.

Bt2—8 to 14 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, firm; common fine roots; thin patchy shiny films on faces of peds; neutral; clear smooth boundary.

Bk1—14 to 22 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; slightly hard, friable; common fine accumulations of carbonate; common fine roots; mildly alkaline; strong effervescence; gradual smooth boundary.

Bk2—22 to 37 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak coarse and medium subangular blocky structure; slightly hard, friable; common fine roots; few pebbles; common fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

C1—37 to 53 inches; light brownish gray (2.5Y 6/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; slightly hard, friable; few pebbles; few fine accumulations of carbonate; strong effervescence; moderately alkaline; clear wavy boundary.

2C2—53 to 60 inches; multicolored gravelly sand; single grain; loose; about 40 percent gravel; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Depth to carbonates: 12 to 34 inches
Depth to a contrasting or impervious layer: More than 40 inches

Talmo Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Rapid
Landform: Moraines
Parent material: Outwash
Slope: 9 to 20 percent

Typical Pedon

Talmo loam, in an area of Delmont-Talmo loams, 9 to 20 percent slopes, 900 feet south and 2,500 feet west of the northwest corner of sec. 1, T. 107 N., R. 67 W.

A—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to weak fine granular;

slightly hard, friable; few pebbles; common fine roots; neutral; abrupt wavy boundary.

2C1—7 to 16 inches; multicolored very gravelly loamy sand; single grain; loose; about 45 percent gravel; few fine roots; coatings of carbonate on the undersides of pebbles; strong effervescence; mildly alkaline; gradual wavy boundary.

2C2—16 to 60 inches; multicolored very gravelly sand; single grain; loose; about 45 percent gravel; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 14 inches
Depth to carbonates: At the surface in plowed areas
Depth to a contrasting or impervious layer: 14 inches or less

Tetonka Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Till plains
Parent material: Alluvium
Slope: Less than 1 percent

Typical Pedon

Tetonka silt loam, 1,939 feet east and 127 feet south of the northwest corner of sec. 29, T. 106 N., R. 65 W.

A—0 to 6 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak thin platy structure parting to weak fine granular; soft, very friable; common fine roots; medium acid; clear irregular boundary.

E1—6 to 10 inches; gray (10YR 6/1) silt loam, dark gray (10YR 4/1) moist; moderate thick platy structure parting to weak fine granular; soft, very friable; common fine roots; medium acid; clear wavy boundary.

E2—10 to 15 inches; light gray (10YR 7/1) silt loam, gray (10YR 5/1) moist; weak thick platy structure parting to moderate fine subangular blocky; slightly hard, very friable; common fine roots; slightly acid; clear smooth boundary.

Bt1—15 to 29 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; extremely hard, very firm, sticky and plastic; thin patchy light gray (10YR 7/1) coatings on faces of peds; thin shiny films on faces of peds; few fine roots; slightly acid; gradual wavy boundary.

Bt2—29 to 35 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) moist; weak medium prismatic structure parting to moderate medium subangular blocky; extremely hard, very firm, sticky and plastic; few fine roots; thin shiny films on faces of peds; neutral; gradual wavy boundary.

Btg—35 to 50 inches; gray (5Y 5/1) silty clay, dark gray (5Y 4/1) moist; weak medium prismatic structure parting to moderate medium subangular blocky; extremely hard, very firm, sticky and plastic; few fine roots; thin shiny films on faces of peds; slight effervescence; mildly alkaline; clear wavy boundary.

Bkg—50 to 60 inches; olive gray (5Y 5/2) clay loam, olive gray (5Y 4/2) moist; massive; extremely hard, very firm, sticky and plastic; common fine accumulations of carbonate; strong effervescence; mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 50 inches
Depth to carbonates: 30 to 60 inches
Other characteristics: A C horizon in some pedons

Worthing Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Slow
Landform: Till plains
Parent material: Alluvium
Slope: Less than 1 percent

Typical Pedon

Worthing silty clay loam, 1,420 feet north and 50 feet west of the southeast corner of sec. 6, T. 108 N., R. 66 W.

A1—0 to 6 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak fine granular structure; slightly hard, friable; many fine roots; medium acid; abrupt wavy boundary.

A2—6 to 13 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak coarse and medium subangular blocky structure; slightly hard, friable; many fine roots; common fine and medium organic stains; neutral; clear wavy boundary.

Bt—13 to 30 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; extremely hard, very firm, very sticky and very plastic; common fine roots; thin shiny films on faces of peds; neutral; gradual wavy boundary.

Btg—30 to 40 inches; gray (10YR 5/1) clay, very dark gray (10YR 3/1) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; extremely hard, very firm, very sticky and

very plastic; common fine roots; thin shiny films on faces of peds; few fine accumulations of carbonate; neutral; clear wavy boundary.

Bkg—40 to 60 inches; gray (5Y 6/1) clay loam, dark gray (5Y 4/1) moist; common fine and medium prominent strong brown (7.5YR 5/8), olive yellow (2.5Y 6/6), and very dark gray (N 3/0) mottles; weak coarse subangular blocky structure; extremely hard, firm, very sticky and very plastic; common fine roots; common fine accumulations of carbonate; strong effervescence; mildly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 35 to 60 inches
Depth to carbonates: 35 to 60 inches
Other characteristics: A C horizon in some pedons

Formation of the Soils

Soil forms when chemical and physical processes act on geologically deposited or accumulated material. The characteristics of the soil at any given point are determined by the climate under which the soil material has accumulated and existed since accumulation, the plant and animal life on and in the soil, the physical and mineralogical composition of the parent material, the relief, and the length of time that the forces of soil formation have acted on the soil material.

Climate and plant and animal life are active factors of soil formation. They act on the parent material and slowly change it to a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for the transformation of the parent material into a soil having genetically related horizons. Some time is always required for the differentiation of soil horizons; and a long time is usually required for the development of distinct horizons.

The five factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four. The following paragraphs relate the factors of soil formation to the soils in Jerauld County.

Climate

Climate directly influences the rate of chemical and physical weathering. Jerauld County has a continental climate characterized by cold winters and hot summers. The average annual air temperature is about 47 degrees F. The average annual precipitation is about 20 inches. Of this, about 75 percent falls during the period April through September. The precipitation is sufficient to leach carbonates in most soils to an average depth of about 20 inches. This climate favors the growth of grasses and the resulting accumulations of organic matter in the upper part of the soil. It generally is uniform throughout the county and thus, as a separate soil-forming factor, does not differentiate the soils within the county. Additional climatic data are given under the heading "General Nature of the County."

Plant and Animal Life

Living organisms have an important effect on soil formation. They include plants, animals, insects, earthworms, bacteria, and fungi. In Jerauld County the tall and mid prairie grasses have had more influence on soil formation than other living organisms. Because of these grasses, the surface layer of many soils has a moderate or high content of organic matter. Onita and Prosper soils have a high content of organic matter.

Earthworms, cicadas, and burrowing animals help to keep the soil open and porous. Bacteria and fungi decompose plant residue, thus releasing plant nutrients.

Parent Material

Parent material is the unconsolidated organic and mineral material in which soil forms. It determines many of the chemical and physical characteristics of the soil, such as color, texture, reaction, and consistence. The rate of soil formation is more rapid in the more friable, loamy and silty parent material than in other kinds of parent material. Also, more changes take place and the horizons are more distinct.

Most of the soils in Jerauld County formed in glacial material derived from preglacial formations of granite, gneiss, limestone, sandstone, and shale. As these materials were transported by the glacier, they were ground up and mixed. They were then redeposited as the glacier melted. Some deposits are unsorted material or glacial till; others are material that was sorted by water during deposition.

Glacial till is a mixture of clay, silt, sand, and gravel that contains few to many cobblestones and boulders. The proportion of each kind of material is determined by the kind of material picked up as the glacier moved. Betts, Clarno, and Ethan soils formed in glacial till that is friable or firm, is loam or clay loam, and has few

fragments of shale. Beadle, Gettys, and Peno soils formed in firm glacial till that is clay loam or clay and has more fragments of shale.

Silty glacial till is material that was deposited on glacial ice and then sorted by wind and water as the glacier melted. Highmore soils formed in silty glacial till. Eakin soils formed in a thin mantle of silty glacial till over loamy glacial till.

The unsorted till in scattered areas in the eastern part of the county has a mantle of stratified loamy glacial till. Hand soils formed partly or entirely in the stratified loamy glacial till.

Glacial outwash consists of sand, gravel, and loamy material deposited by glacial meltwater. Alwilda, Canning, Delmont, Enet, and Talmo soils formed in loamy glacial outwash underlain by sand and gravel within a depth of 40 inches. Ree soils formed in loamy sediments more than 40 inches thick over sand and gravel.

Onita, Plankinton, Prosper, and Tetonka are examples of soils that formed partly or entirely in local alluvium from adjacent uplands. Bon, Durrstein, and Egas soils formed in alluvium deposited by streams.

Relief

Relief affects drainage, runoff, erosion, plant cover, and soil temperature. Much moisture from rainfall on Betts soils, for example, is lost because of excessive runoff. As as a result of this runoff, a limited amount of moisture penetrates the surface and soil is lost through erosion. Betts soils are calcareous at or near the surface, and the layers in which organic matter accumulates are thin.

The runoff rate is slower on Clarno, Highmore, and Houdek soils than on Betts soils. As a result, more moisture penetrates the surface, the layers in which organic matter accumulates are thicker, and the soils are calcareous at a depth of more than 10 inches.

Onita and Prosper soils are in swales that receive extra moisture as runoff from adjacent soils. The layers in which organic matter accumulates are thicker than those in Clarno, Highmore, and Houdek soils. Also, carbonates are leached to a greater depth.

Drainage is impeded in some low areas. The high, fluctuating water table in these areas favors the concentration of carbonates near the surface. Arlo soils are in these low areas.

Time

The length of time that climate, plant and animal life, and relief have affected the parent material helps to determine the kind of soil that forms. All of the soils in Jerauld County are young. The youngest soils are those on active flood plains. Bon and Clarno soils are examples.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Back slope. The steepest inclined surface and principal element of many hill slopes. Back slopes are commonly steep and linear and descend to a foot slope. Back slopes are erosional forms produced mainly by mass wasting and running water.

Basin. A depressed area with no surface outlet. Examples include closed depressions in a glacial till plain or lake basin.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate

pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour farming. Growing crops in strips that follow the contour.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cross-fencing. The use of fences to divide pasture or rangeland into manageable units.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. The thickness of weathered soil material over bedrock. The depth classes recognized in this survey are:

Very deep	more than 60 inches
Deep	40 to 60 inches
Moderately deep	20 to 40 inches
Shallow	less than 20 inches

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow

is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan. A relict alluvial fan, which is no longer a site of active deposition.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and may occur in the form of outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep or very deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface soil.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Landform. Any physical, recognizable form or feature of the earth's surface. Landforms have a characteristic shape and are produced by natural causes.

Landscape. All the natural features, such as fields, hills, forests, and areas of water, that distinguish one part of the earth's surface from another part.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Lowland. The low and relatively level ground of a region, in contrast with the adjacent, higher country.

Low strength. The soil is not strong enough to support loads.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of drift that has a topographic expression of its own and is produced mainly by the direct action of glacial ice.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Nutrient, plant. Any element taken in by a plant

essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plain. An area that ranges from level to gently sloping or undulating. A plain has few or no prominent hills or valleys.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Potential native vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, many wetlands, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rock fragments. Rock or mineral fragments having a

diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shoulder slope. The uppermost inclined surface at the top of a hill slope. Shoulder slopes are transition zones from back slopes to a summit in upland areas. They dominantly are convex in profile and erosional in origin.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. The slope classes recognized in this survey area are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 percent
Gently undulating	1 to 3 percent
Gently sloping or undulating	2 or 3 to 6 percent
Moderately sloping or gently rolling	6 to 9 percent
Moderately steep	9 to 20 percent
Steep	20 to 40 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It reduces the soil loss from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The top or highest level of an upland feature. A high interfluve area that has gentler slopes and that is flanked by the steeper hill slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill slope; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, and copper, in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-81 at Wessington Springs, South Dakota)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	23.9	4.4	14.2	56	-23	16	0.31	0.08	0.48	1	3.6
February	30.7	11.2	21.0	61	-18	18	.61	.16	.96	2	6.4
March	42.6	22.3	32.5	75	-10	102	1.33	.37	2.09	3	7.3
April	59.1	35.9	47.5	88	16	251	2.37	.99	3.53	5	2.7
May	71.1	47.0	59.1	92	27	592	3.23	1.49	4.71	6	.1
June	80.8	57.3	69.1	101	42	873	3.51	1.92	4.91	7	.0
July	87.4	62.8	75.1	106	50	1,088	2.65	1.03	4.01	5	.0
August	85.7	60.6	73.2	104	46	1,029	2.39	.84	3.67	4	.0
September	75.1	50.5	62.8	98	32	684	1.46	.36	2.33	4	.0
October	62.4	39.9	51.2	87	20	358	1.47	.39	2.33	3	1.0
November	43.8	25.4	34.6	72	0	34	.76	.11	1.24	2	3.3
December	29.6	11.7	20.7	59	-17	7	.46	.12	.73	2	4.2
Yearly:											
Average	57.7	35.8	46.8	---	---	---	---	---	---	---	---
Extreme	---	---	---	108	-23	---	---	---	---	---	---
Total	---	---	---	---	---	5,052	20.55	16.09	24.66	44	28.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-81 at Wessington Springs, South Dakota)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 22	May 6	May 19
2 years in 10 later than--	Apr. 17	Apr. 30	May 13
5 years in 10 later than--	Apr. 7	Apr. 19	May 2
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 14	Oct. 5	Sept. 25
2 years in 10 earlier than--	Oct. 19	Oct. 10	Sept. 30
5 years in 10 earlier than--	Oct. 29	Oct. 18	Oct. 10

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-81 at Wessington Springs, South Dakota)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	186	161	138
8 years in 10	192	168	145
5 years in 10	204	180	160
2 years in 10	218	194	177
1 year in 10	226	202	187

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ad	Alwilda loam	380	0.1
Af	Arlo loam	490	0.1
Ar	Artesian silty clay	585	0.2
At	Artesian-Bullcreek complex	948	0.3
Av	Artesian-Durrstein Variant complex	1,190	0.3
Ba	Baltic silty clay	580	0.2
BdA	Beadle loam, 0 to 2 percent slopes	700	0.2
BdB	Beadle loam, 2 to 6 percent slopes	2,390	0.7
BgB	Beadle-Jerauld-Dudley complex, 1 to 5 percent slopes	7,310	2.2
BlB	Beadle-Lane complex, 1 to 5 percent slopes	3,840	1.1
BmD	Betts-Ethan loams, 6 to 40 percent slopes, stony	9,420	2.8
BoE	Betts-Ethan loams, 15 to 40 percent slopes	5,943	1.8
Br	Bon loam	3,840	1.1
Bv	Bon loam, channeled	4,275	1.3
CdB	Canning-Delmont loams, 2 to 6 percent slopes	1,670	0.5
Cm	Clamo silty clay loam	510	0.1
CpB	Clarno-Ethan-Prosper loams, 1 to 5 percent slopes	29,660	8.7
CpC	Clarno-Ethan-Prosper loams, 2 to 9 percent slopes	4,150	1.2
CrA	Clarno-Prosper loams, 0 to 2 percent slopes	21,740	6.3
DaA	Davis loam, 0 to 2 percent slopes	1,035	0.3
DaB	Davis loam, 2 to 9 percent slopes	2,460	0.7
Dc	Davison loam	235	0.1
DeC	Delmont loam, 6 to 9 percent slopes	1,180	0.3
DgA	Delmont-Enet loams, 0 to 2 percent slopes	884	0.3
DkD	Delmont-Ethan loams, 9 to 20 percent slopes	2,975	0.9
DmD	Delmont-Talmo loams, 9 to 20 percent slopes	2,855	0.8
DpA	Dudley-Jerauld complex, 0 to 3 percent slopes	3,350	1.0
Du	Durrstein silt loam	6,475	1.9
Dx	Durrstein-Egas complex	1,920	0.5
Dz	Durrstein Variant-Artesian complex	1,580	0.5
EaB	Eakin-Ethan-Onita complex, 2 to 6 percent slopes	11,100	3.3
EnA	Enet loam, 0 to 2 percent slopes	2,900	0.9
EpB	Enet-Delmont loams, 2 to 6 percent slopes	2,880	0.8
EtD	Ethan-Betts loams, 9 to 20 percent slopes	19,025	5.6
Fa	Farmsworth-Artesian complex	985	0.3
Fd	Farmsworth-Lane complex	1,045	0.3
Fe	Fedora loam	1,125	0.3
GpD	Gettys-Peno complex, 9 to 20 percent slopes	3,250	1.0
HaB	Hand-Ethan-Prosper loams, 1 to 5 percent slopes	7,740	2.3
HaC	Hand-Ethan-Prosper loams, 2 to 9 percent slopes	4,810	1.4
HcA	Hand-Prosper loams, 0 to 3 percent slopes	1,785	0.5
HeB	Henkin loam, 1 to 5 percent slopes	1,830	0.5
HfD	Henkin Variant sandy loam, 6 to 40 percent slopes	500	0.1
HhA	Highmore-Onita silt loams, 0 to 3 percent slopes	5,375	1.6
HlA	Homme-Onita-Beadle complex, 0 to 2 percent slopes	4,270	1.3
HpB	Homme-Peno complex, 2 to 6 percent slopes	13,680	4.0
HpC	Homme-Peno complex, 6 to 9 percent slopes	2,510	0.7
HrA	Houdek-Dudley complex, 0 to 3 percent slopes	10,780	3.2
HtB	Houdek-Dudley-Jerauld complex, 2 to 6 percent slopes	1,240	0.4
HwB	Houdek-Ethan-Prosper loams, 1 to 5 percent slopes	31,250	9.1
HwC	Houdek-Ethan-Prosper loams, 2 to 9 percent slopes	29,103	8.5
HyA	Houdek-Prosper loams, 0 to 3 percent slopes	6,730	2.0
Ln	Lane silty clay loam	6,840	2.0
Lw	Lawet loam	1,145	0.3
On	Onita silt loam, 0 to 3 percent slopes	5,625	1.6
Op	Onita-Plankinton silt loams	1,955	0.6
PgC	Peno-Gettys complex, 6 to 9 percent slopes	5,720	1.7
Ph	Pits, gravel	270	0.1
Pk	Plankinton silt loam	3,745	1.1
Pr	Plankinton-Crossplain complex	9,300	2.7
ReA	Ree loam, 0 to 2 percent slopes	885	0.3
ReB	Ree loam, 2 to 6 percent slopes	905	0.3
RnA	Ree-Canning loams, 0 to 2 percent slopes	3,610	1.1
RnB	Ree-Canning loams, 2 to 6 percent slopes	305	0.1

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
Te	Tetonka silt loam	4,620	1.4
Wo	Worthing silty clay loam	3,480	1.0
Wp	Worthing silty clay loam, ponded	2,370	0.7
	Areas of water	1,344	0.4
	Total	340,602	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
Af	Arlo loam (where drained)
Br	Bon loam
Cm	Clamo silty clay loam (where drained)
DaA	Davis loam, 0 to 2 percent slopes
Dc	Davison loam
Ln	Lane silty clay loam
On	Onita silt loam, 0 to 3 percent slopes

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Corn	Oats	Winter wheat	Grain sorghum	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Tons	AUM*
Ad---------- Alwilda	42	48	---	40	1.7	2.8
Af. Arlo						
Ar---------- Artesian	---	51	35	48	2.6	4.3
At. Artesian-Bullcreek						
Av. Artesian-Durrstein Variant						
Ba. Baltic						
BdA---------- Beadle	50	57	---	50	2.8	4.7
BdB---------- Beadle	48	55	---	48	2.8	4.7
BgB---------- Beadle-Jerauld-Dudley	33	38	---	31	1.6	2.6
BlB---------- Beadle-Lane	50	61	---	51	2.8	---
BmD, BoE. Betts-Ethan						
Br---------- Bon	60	69	---	67	3.1	5.2
Bv. Bon						
CdB---------- Canning-Delmont	26	37	---	30	1.1	1.9
Cm---------- Clamo	50	50	---	---	2.8	4.7
CpB---------- Clarno-Ethan-Prosper	56	62	---	53	2.7	4.6
CpC---------- Clarno-Ethan-Prosper	50	55	---	47	2.5	4.2
CrA---------- Clarno-Prosper	61	68	---	60	2.9	4.9
DaA---------- Davis	64	73	---	65	3.6	6.0

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Winter wheat	Grain sorghum	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Tons	AUM*
DaB---------- Davis	60	72	---	63	2.9	4.8
Dc---------- Davison	51	59	---	45	2.4	4.0
DeC. Delmont						
DgA---------- Delmont-Enet	32	37	---	32	1.4	2.4
DkD. Delmont-Ethan						
DmD. Delmont-Talmo						
DpA---------- Dudley-Jerauld	20	26	---	25	1.0	1.8
Du. Durrstein						
Dx. Durrstein-Egas						
Dz. Durrstein Variant-Artesian						
EaB---------- Eakin-Ethan-Onita	47	55	---	49	2.2	3.6
EnA---------- Enet	42	49	---	43	2.0	3.3
EpB---------- Enet-Delmont	34	38	---	34	1.6	2.7
EtD. Ethan-Betts						
Fa---------- Farmsworth-Artesian	---	46	28	41	2.2	3.7
Fd---------- Farmsworth-Lane	---	55	---	44	2.4	---
Fe---------- Fedora	40	42	---	40	2.5	4.2
GpD. Gettys-Peno						
HaB---------- Hand-Ethan-Prosper	56	61	---	54	2.6	4.4
HaC---------- Hand-Ethan-Prosper	48	54	---	47	2.5	4.0

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Winter wheat	Grain sorghum	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Tons	AUM*
HcA---------- Hand-Prosper	62	67	---	62	2.8	4.7
HeB---------- Henkin	47	45	---	42	1.8	3.0
HfD. Henkin Variant						
HhA---------- Highmore-Onita	48	61	33	55	2.4	3.9
HlA---------- Homme-Onita-Beadle	60	62	---	59	2.9	4.7
HpB---------- Homme-Peno	49	53	---	47	2.4	4.0
HpC---------- Homme-Peno	42	47	---	39	2.1	3.5
HrA---------- Houdek-Dudley	43	50	---	45	2.1	3.5
HtB---------- Houdek-Dudley-Jerauld	35	40	---	33	1.8	2.9
HwB, HwC---------- Houdek-Ethan-Prosper	54	62	---	53	2.5	4.3
HyA---------- Houdek-Prosper	61	67	---	61	2.9	4.7
Ln---------- Lane	53	70	---	54	2.8	---
Lw---------- Lawet	70	---	35	45	3.8	---
On---------- Onita	60	63	35	63	2.8	4.7
Op---------- Onita-Plankinton	45	47	---	47	2.7	4.4
PgC---------- Peno-Gettys	---	37	---	23	1.5	2.4
Ph** Pits						
Pk---------- Plankinton	15	15	---	15	2.5	4.0
Pr---------- Plankinton-Crossplain	29	29	---	27	2.7	4.4
ReA---------- Ree	38	55	34	45	1.8	---

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Winter wheat	Grain sorghum	Alfalfa hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Tons	AUM*
ReB---------- Ree	33	51	31	40	1.5	---
RnA---------- Ree-Canning	35	53	---	42	1.7	---
RnB---------- Ree-Canning	29	48	---	37	1.4	---
Te. Tetonka						
Wo, Wp. Worthing						

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RANGELAND CHARACTERISTIC VEGETATION AND PRODUCTIVITY

Range site and map symbols	Potential natural plant community		Potential annual production for kind of growing season		
	Common plant name	Composition	Favorable	Average	Unfavorable
		Pct	Lb/acre	Lb/acre	Lb/acre
Clayey---------- BdA; BdB; Beadle part of BgB; BlB; Lane part of Fd; Ln; Peno part of GpD, HpB, HpC, and PgC	Western wheatgrass----------	35	3,100	2,600	1,800
	Green needlegrass----------	30			
	Little bluestem----------	10			
	Big bluestem----------	5			
	Sideoats grama----------	5			
	Bluegrama----------	5			
	Buffalograss----------	5			
	Climax forbs----------	5			
Claypan---------- Dudley part of BgB, DpA, HrA, and HtB; Farmsworth part of Fa and Fd	Western wheatgrass----------	45	2,400	2,000	1,400
	Green needlegrass----------	15			
	Bluegrama----------	15			
	Needleandthread----------	5			
	Buffalograss----------	5			
	Bluegrama----------	5			
	Sedges----------	5			
	Climax forbs----------	5			
Closed Depression-------- Pk; Plankinton part of Op and Pr	Western wheatgrass----------	85	3,900	3,500	2,400
	Sedges----------	10			
	Climax forbs----------	5			
Dense Clay---------- Bullcreek part of At	Western wheatgrass----------	65	2,300	1,800	1,100
	Green needlegrass----------	25			
	Climax forbs----------	10			
Limy Subirrigated-------- Dc	Little bluestem----------	50	4,300	3,600	2,500
	Big bluestem----------	20			
	Needlegrass----------	15			
	Western wheatgrass----------	5			
	Sideoats grama----------	5			
	Climax forbs----------	5			
Overflow---------- Br; Bv; Cm; Crossplain part of Pr; Onita part of EaB, HhA, HlA, and Op; Prosper part of CpB, CpC, CrA, HaB, HaC, HcA, HwB, HwC, and HyA	Big bluestem----------	55	4,600	3,800	2,700
	Green needlegrass----------	15			
	Western wheatgrass----------	5			
	Indiangrass----------	5			
	Little bluestem----------	5			
	Switchgrass----------	5			
	Sideoats grama----------	5			
	Sedges----------	3			
	Climax forbs----------	2			
	Climax shrubs----------	5			
Saline Lowland---------- Du; Dx	Prairie cordgrass----------	35	4,100	3,700	2,900
	Western wheatgrass----------	25			
	Nuttall alkaligrass----------	10			
	Alkali sacaton----------	5			
	Switchgrass----------	5			
	Saltgrass----------	10			
	Sedges----------	5			
	Climax forbs----------	5			
Sandy---------- Ad; HeB; HfD	Prairie sandreed----------	20	3,400	2,800	2,000
	Little bluestem----------	20			
	Big bluestem or sand bluestem	20			
	Needleandthread----------	15			
	Western wheatgrass----------	5			
	Sideoats grama----------	5			
	Bluegrama----------	5			
	Sedges----------	5			
	Climax forbs----------	5			

TABLE 7.--RANGELAND CHARACTERISTIC VEGETATION AND PRODUCTIVITY--Continued

Range site and map symbols	Potential natural plant community		Potential annual production for kind of growing season		
	Common plant name	Composition	Favorable	Average	Unfavorable
		Pct	Lb/acre	Lb/acre	Lb/acre
Shallow Marsh---------- Wo	Rivergrass----------	40	7,000	6,400	5,100
	Slough sedge----------	35			
	American mannagrass----------	5			
	Common spikesedge----------	5			
	Prairie cordgrass----------	5			
	Climax forbs----------	10			
Shallow to Gravel-------- DeC; Delmont part of CdB, DgA, DkD, DmD, and EpB	Needleandthread----------	40	2,300	1,900	1,100
	Bluegrama----------	20			
	Western wheatgrass----------	10			
	Prairie dropseed----------	5			
	Little bluestem----------	5			
	Plains muhly----------	5			
	Sideoats grama----------	5			
	Climax forbs----------	5			
	Climax shrubs----------	5			
Silty---------- Canning part of CdB; Clarno part of CpB, CpC, and CrA; DaA; DaB; Eakin part of EaB; EnA; Enet part of DgA and EpB; Ethan part of BmD, BoE, CpB, CpC, DkD, EaB, EtD, HaB, HaC, HwB, and HwC; Hand part of HaB, HaC, and HcA; Highmore part of HhA; Homme part of HlA, HpB, and HpC; Houdek part of HtB, HwC, and HyA; ReA; ReB; RnA; RnB	Green needlegrass----------	30	3,400	2,800	2,000
	Western wheatgrass----------	15			
	Big bluestem----------	15			
	Needleandthread----------	5			
	Porcupinegrass----------	5			
	Little bluestem----------	5			
	Prairie dropseed----------	5			
	Sideoats grama----------	5			
	Bluegrama----------	5			
	Climax forbs----------	5			
	Climax shrubs----------	5			
Subirrigated---------- Ar; Artesian part of At, Av, Dz, and Fa; Fe; Lw	Big bluestem----------	60	5,600	5,100	4,100
	Switchgrass----------	10			
	Indiangrass----------	5			
	Little bluestem----------	5			
	Western wheatgrass----------	5			
	Bluegrasses----------	5			
	Sedges----------	5			
	Climax forbs----------	5			
Thin Claypan---------- Durrstein Variant part of Av and Dz; Jerauld part of BgB, DpA, and HtB	Western wheatgrass----------	45	1,800	1,500	900
	Bluegrama----------	30			
	Buffalograss----------	10			
	Inland saltgrass----------	5			
	Sedges----------	5			
	Climax forbs----------	5			
Thin Upland---------- Betts part of BmD, BoE, and EtD; Gettys part of GpD and PgC	Little bluestem----------	40	2,900	2,400	1,700
	Big bluestem----------	5			
	Green needlegrass----------	5			
	Needleandthread----------	10			
	Western wheatgrass----------	5			
	Sideoats grama----------	10			
	Plains muhly----------	5			
	Prairie sandreed----------	5			
	Bluegrama----------	10			
	Climax forbs----------	5			
	Climax shrubs----------	5			

TABLE 7.--RANGELAND CHARACTERISTIC VEGETATION AND PRODUCTIVITY--Continued

Range site and map symbols	Potential natural plant community		Potential annual production for kind of growing season		
	Common plant name	Composition	Favorable	Average	Unfavorable
		Pct	Lb/acre	Lb/acre	Lb/acre
Very Shallow---------- Talmo part of DmD	Needleandthread----------	30	1,700	1,400	800
	Bluegrama or hairy grama-----	30			
	Plains muhly----------	5			
	Sedges----------	15			
	Western wheatgrass----------	5			
	Red threeawn----------	5			
	Climax forbs----------	5			
	Climax shrubs----------	5			
Wetland---------- Af; Ba	Prairie cordgrass----------	65	6,600	6,000	4,800
	Reedgrass----------	10			
	Reed canarygrass----------	5			
	Switchgrass----------	5			
	Sedges and rushes----------	5			
	Climax forbs----------	5			
	Climax shrubs----------	5			
Wet Meadow---------- Te	Sedges----------	50	4,400	4,000	2,800
	Reedgrass----------	20			
	Prairie cordgrass----------	15			
	Western wheatgrass----------	5			
	Fowl bluegrass----------	5			
	Rushes----------	5			

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than)

Windbreak suitability group and map symbols	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Group 1----------Ar; Artesian part of At, Av, Dz, and Fa; Br; Bv; DaA; DaB, On; Onita part of EaB, HhA, HlA, and Op; Prosper part of CpB, CpC, CrA, HaB, HaC, HcA, HwB, HwC, and HyA	Common lilac, late lilac, Peking cotoneaster, European cotoneaster, redosier dogwood, Nanking cherry, golden currant, Hansen hedgerose, skunkbush sumac, western sandcherry, Mongolian cherry, Juneberry, silver buffaloberry, Amur honeysuckle.	Ussurian pear, eastern redcedar, Rocky Mountain juniper, common chokecherry, Manchurian apricot, Siberian apricot, Amur maple, caragana, Tatarian honeysuckle, American plum.	Green ash, hackberry, bur oak, blue spruce, Black Hills spruce, Russian-olive, ponderosa pine, Austrian pine, Scotch pine, Siberian crabapple, Manchurian crabapple.	Siberian elm, golden willow, white willow, silver maple, honeylocust.	Eastern cottonwood, northwest poplar, Carolina poplar, robusta poplar.
Group 2----------Af; Cm; Crossplain part of Pr; Fe; Lw	Caragana, Nanking cherry, Tatarian honeysuckle, Amur honeysuckle, silver buffaloberry, late lilac, common lilac, Peking cotoneaster, European cotoneaster, skunkbush sumac, American plum, golden currant, Hansen hedgerose, western sandcherry, Mongolian cherry, Juneberry.	Russian-olive, Ussurian pear, eastern redcedar, Rocky Mountain juniper, Manchurian apricot, Siberian apricot, Missouri River willow, Amur maple, common chokecherry.	Blue spruce, Black Hills spruce, green ash, hackberry, ponderosa pine, Austrian pine, Scotch pine, bur oak, Russian mulberry, Siberian crabapple, Manchurian crabapple.	Carolina poplar, silver maple, golden willow, white willow, honeylocust.	Eastern cottonwood, northwest poplar, robusta poplar.
Group 3----------Clarno part of CpB, CpC, and CrA; DaA; DaB; Dc; Eakin part of EaB; Hand part of HaB, HaC, and HcA; Highmore part of Hh; Homme part of HlA, HpB, and HpC; Houdek part of HrA, HtB, HwB, HwC, and HyA; Ln; Lane part of BlB and Fd; ReA; ReB; Ree part of RnA and RnB	American plum, silver buffaloberry, Tatarian honeysuckle, Amur honeysuckle, late lilac, redosier dogwood, Nanking cherry, Peking cotoneaster, golden currant, European cotoneaster, skunkbush sumac, Hansen hedgerose, western sandcherry, Mongolian cherry.	Siberian apricot, common chokecherry, Amur maple, Rocky Mountain juniper, eastern redcedar, bur oak, Ussurian pear, Manchurian crabapple, common lilac, caragana.	Blue spruce, Black Hills spruce, ponderosa pine, Austrian pine, Scotch pine, green ash, hackberry, Russian mulberry, Siberian crabapple, Russian-olive.	Siberian elm, silver maple, honeylocust.	---

See footnotes at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Windbreak suitability group and map symbols	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Group 4---------- BdA; BdB; Beadle part of BgB, BlB, and HlA; Peno part of GpD, HpB, HpC, and PgC	Caragana, Tatarian honeysuckle, Amur honeysuckle, American plum, silver buffaloberry, Peking cotoneaster, European cotoneaster, common lilac, Nanking cherry, skunkbush sumac, golden currant.	Ponderosa pine, Russian-olive, Rocky Mountain juniper, eastern redcedar, Siberian crabapple, Manchurian crabapple, Ussurian pear, Manchurian apricot, Siberian apricot, common chokecherry, bur oak.	Siberian elm, honeylocust, green ash, hackberry.	---	---
Group 5---------- HeB	Silver buffaloberry, Nanking cherry, European cotoneaster, Peking cotoneaster, Tatarian honeysuckle, American plum, skunkbush sumac, golden currant, western sandberry, common lilac.	Bur oak, Russian-olive, Rocky Mountain juniper, eastern redcedar, Siberian crabapple, Manchurian crabapple, Ussurian pear, Manchurian apricot, common chokecherry, Siberian apricot, caragana.	Honeylocust, green ash, hackberry, ponderosa pine, Russian-olive.	Siberian elm------	---
Group 6---------- Ad; Canning part of RnA and RnB; CdB; DeC; DgA; EnA; EpB	Tatarian honeysuckle, silver buffaloberry, Peking cotoneaster, European cotoneaster, common lilac.	Hackberry, ponderosa pine, Russian-olive, Rocky Mountain juniper, eastern redcedar, Siberian crabapple, Manchurian crabapple, Ussurian pear, caragana.	Honeylocust, green ash.	Siberian elm------	---
Group 7*.					
Group 8---------- Ethan part of CpB, CpC, EaB, HaB, HaC, HwB, and HwC; Gettys part of PgC	Ussurian pear, caragana, American plum, common lilac, Peking cotoneaster, European cotoneaster, silver buffaloberry, golden currant, skunkbush sumac.	Green ash, hackberry, Russian-olive, ponderosa pine, Rocky Mountain juniper, eastern redcedar.	Siberian elm, honeylocust.	---	---

See footnotes at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Windbreak suitability group and map symbols	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Group 9---------- Dudley part of BgB, DpA, HrA, and HtB; Farmsworth part of Fa and Fd	Eastern redcedar, Rocky Mountain juniper, Ussurian pear, caragana, silver buffaloberry, common lilac.	Siberian elm, green ash, ponderosa pine.	---	---	---
Group 10**. Af; Ba; BmD; BoE, Bullcreek part of At; Delmont part of DmD; DkD; Du; Durrstein Variant part of Av and Dz; Dx; EtD; Gettys part of GpD; HfD					

* No soils in Jerauld County are in this group.
** Soils in this group generally are not suited to trees.

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements								
	Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted trees and shrubs	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas	Native deciduous trees
Ad Alwilda	Fair	Fair	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
Af Arlo	Very poor.	Poor	Fair	Good	Very poor.	Very poor.	Fair	Fair	Poor.
Ar Artesian	Good	Good	Fair	Good	Very poor.	Poor	Poor	Poor	Fair.
At*: Artesian	Good	Good	Fair	Good	Very poor.	Poor	Poor	Poor	Fair.
Bullcreek	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Av*: Artesian	Good	Good	Fair	Good	Very poor.	Poor	Poor	Poor	Fair.
Durrstein Variant	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.
Ba Baltic	Very poor.	Poor	Poor	Poor	Very poor.	Fair	Fair	Fair	Very poor.
BdA Beadle	Good	Fair	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
BdB Beadle	Fair	Fair	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
BgB*: Beadle	Fair	Fair	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
Jerauld	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Dudley	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
BlB*: Beadle	Fair	Fair	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
Lane	Good	Fair	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Fair.
BmD*: Betts	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Ethan	Very poor.	Very poor.	Good	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								
	Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted trees and shrubs	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas	Native deciduous trees
BoE*:									
Betts	Very poor.	Very poor.	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Ethan	Very poor.	Very poor.	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Br Bon	Good	Good	Good	Good	Very poor.	Fair	Very poor.	Very poor.	Good.
Bv Bon	Very poor.	Good	Good	Poor	Very poor.	Fair	Very poor.	Very poor.	Good.
CdB*:									
Canning	Fair	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.
Delmont	Poor	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.
Cm Clamo	Good	Poor	Fair	Good	Very poor.	Poor	Fair	Fair	Poor.
CpB*:									
Clarno	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Ethan	Fair	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.
Prosper	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
CpC*:									
Clarno	Fair	Good	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
Ethan	Poor	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Prosper	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
CrA*:									
Clarno	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Prosper	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
DaA Davis	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Good.
DaB Davis	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Good.
Dc Davison	Good	Good	Good	Good	Very poor.	Poor	Poor	Poor	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								
	Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted trees and shrubs	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas	Native deciduous trees
DeC									
Delmont	Very poor.	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
DgA*:									
Delmont	Poor	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.
Enet	Fair	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.
DkD*:									
Delmont	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Ethan	Very poor.	Very poor.	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
DmD*:									
Delmont	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Talmo	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
DpA*:									
Dudley	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
Jerauld	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Du									
Durrstein	Very poor.	Very poor.	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
Dx*:									
Durrstein	Very poor.	Very poor.	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
Egas	Very poor.	Very poor.	Fair	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Dz*:									
Durrstein Variant	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.
Artesian	Good	Good	Fair	Good	Very poor.	Poor	Poor	Poor	Very poor.
EaB*:									
Eakin	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Ethan	Fair	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Onita	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
EnA									
Enet	Fair	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								
	Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted trees and shrubs	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas	Native deciduous trees
EpB*:									
Enet	Fair	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.
Delmont	Poor	Fair	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
EtD*:									
Ethan	Very poor.	Very poor.	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Betts	Very poor.	Very poor.	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Fa*:									
Farmsworth	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Artesian	Good	Good	Fair	Good	Very poor.	Poor	Poor	Poor	Poor.
Fd*:									
Farmsworth	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Lane	Good	Fair	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Fair.
Fe	Fair	Good	Fair	Good	Very poor.	Poor	Fair	Fair	Fair.
Fedora									
GpD*:									
Gettys	Very poor.	Very poor.	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.
Peno	Very poor.	Very poor.	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.
HaB*:									
Hand	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Ethan	Fair	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Very. poor.
Prosper	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
HaC*:									
Hand	Fair	Good	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
Ethan	Poor	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Prosper	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								
	Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted trees and shrubs	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas	Native deciduous trees
HcA*:									
Hand	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Prosper	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
HeB	Fair	Fair	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
Henkin									
HfD	Very poor.	Poor	Good	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Henkin Variant									
HhA*:									
Highmore	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Onita	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
HlA*:									
Homme	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Onita	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
Beadle	Good	Fair	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
HpB*:									
Homme	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Peno	Fair	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
HpC*:									
Homme	Fair	Good	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
Peno	Poor	Good	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
HrA*:									
Houdek	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Dudley	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
HtB*:									
Houdek	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Dudley	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Jerauld	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								
	Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted trees and shrubs	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas	Native deciduous trees
HwB*, HwC*:									
Houdek	Fair	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Ethan	Poor	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.
Prosper	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
HyA*:									
Houdek	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Prosper	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
Ln Lane	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
Lw Lawet	Poor	Fair	Good	Fair	Fair	Fair	Good	Good	Poor.
On Onita	Good	Good	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair.
Op*:									
Onita	Good	Poor	Fair	Good	Poor	Fair	Very poor.	Very poor.	Fair.
Plankinton	Poor	Fair	Poor	Poor	Very poor.	Poor	Fair	Fair	Very poor.
PgC*:									
Peno	Poor	Good	Good	Fair	Very poor.	Poor	Very poor.	Very poor.	Poor.
Gettys	Poor	Fair	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.
Ph*. Pits									
Pk Plankinton	Poor	Poor	Poor	Poor	Very poor.	Poor	Fair	Fair	Very poor.
Pr*:									
Plankinton	Poor	Poor	Poor	Poor	Very poor.	Poor	Fair	Fair	Very poor.
Crossplain	Good	Good	Good	Good	Very poor.	Poor	Poor	Poor	Very poor.
ReA, ReB Ree	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.
RnA*, RnB*:									
Ree	Good	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								
	Grain and seed crops	Grasses and legumes	Native herbaceous plants	Planted trees and shrubs	Native coniferous plants	Native shrubs	Wetland plants	Shallow water areas	Native deciduous trees
RnA*, RnB*: Canning	Fair	Fair	Good	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor.
Te Tetonka	Poor	Poor	Fair	Poor	Very poor.	Poor	Fair	Fair	Very poor.
Wo Worthing	Very poor.	Poor	Poor	Poor	Very poor.	Poor	Good	Good	Very poor.
Wp Worthing	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Ad Alwilda	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Af Arlo	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
Ar Artesian	Moderate: too clayey, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.
At*: Artesian	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Bullcreek	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Av*: Artesian	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Durrstein Variant	Moderate: too clayey, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength.
Ba Baltic	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.
BdA, BdB Beadle	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
BgB*: Beadle	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Jerauld	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Dudley	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
BlB*:					
Beadle	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Lane	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
BmD*, BoE*:					
Betts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Ethan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Br Bon	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding, frost action.
Bv Bon	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.
CdB*:					
Canning	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.
Delmont	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Cm Clamo	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
CpB*:					
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Prosper	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.
CpC*:					
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
CpC*:					
Prosper	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.
CrA*:					
Clarno	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Prosper	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.
DaA Davis	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
DaB Davis	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
Dc Davison	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action.
DeC Delmont	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
DgA*:					
Delmont	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Enet	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
DkD*:					
Delmont	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Ethan	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.
DmD*:					
Delmont	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Talmo	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
DpA*:					
Dudley	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Jerauld	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Du---------- Durrstein	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
Dx*:					
Durrstein--------	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
Egas----------	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.
Dz*:					
Durrstein Variant	Moderate: too clayey, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength.
Artesian---------	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
EaB*:					
Eakin----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
Ethan----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
Onita----------	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.
EnA---------- Enet	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
EpB*:					
Enet----------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
Delmont----------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
EtD*:					
Ethan----------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.
Betts----------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Fa*:					
Farmsworth	Moderate: too clayey, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.
Artesian	Moderate: too clayey, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.
Fd*:					
Farmsworth	Moderate: too clayey, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.
Lane	Moderate: too clayey.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength.
Fe Fedora	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.
GpD*:					
Gettys	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
Peno	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
HaB*:					
Hand	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Prosper	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.
HaC*:					
Hand	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
Prosper	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
HcA*:					
Hand	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
Prosper	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.
HeB	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.
Henkin					
HfD	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Henkin Variant					
HhA*:					
Highmore	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Severe: low strength.
Onita	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.
HlA*:					
Homme	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Onita	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.
Beadle	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
HpB*, HpC*:					
Homme	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Peno	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
HrA*:					
Houdek	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Dudley	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
HtB*:					
Houdek	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
HtB*:					
Dudley	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Jerauld	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
HwB*:					
Houdek	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Prosper	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.
HwC*:					
Houdek	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Ethan	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.
Prosper	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.
HyA*:					
Houdek	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Prosper	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.
Ln Lane	Moderate: too clayey.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength.
Lw Lawet	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: frost action.
On Onita	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Op*:					
Onita	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.
Plankinton	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell, low strength.
PgC*:					
Peno	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Gettys	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Ph*. Pits					
Pk Plankinton	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell, low strength.
Pr*:					
Plankinton	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell, low strength.
Crossplain	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.
ReA Ree	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
ReB Ree	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
RnA*:					
Ree	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Canning	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
RnB*:					
Ree	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
RnB*:					
Canning	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.
Te Tetonka	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: shrink-swell, ponding.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.
Wo Worthing	Severe: ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, low strength, ponding.
Wp Worthing	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ad Alwilda	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Af Arlo	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
Ar Artesian	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
At*: Artesian	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
Bullcreek	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Av*: Artesian	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
Durrstein Variant	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, excess sodium.
Ba Baltic	Severe: flooding, wetness, percs slowly.	Slight	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
BdA Beadle	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
BdB Beadle	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
BgB*: Beadle	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Jerauld	Severe: percs slowly.	Slight	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BgB*:					
Dudley	Severe: percs slowly.	Slight	Severe: excess sodium.	Slight	Poor: hard to pack, excess sodium.
BlB*:					
Beadle	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Lane	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
BmD*:					
Betts	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Ethan	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
BoE*:					
Betts	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Ethan	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Br	Moderate: flooding, percs slowly.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Good.
Bv	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
CdB*:					
Canning	Severe: poor filter.	Severe: seepage.	Severe: too sandy, seepage.	Severe: seepage.	Poor: too sandy, small stones.
Delmont	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones, seepage, too sandy.
Cm	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
CpB*:					
Clarno	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CpB*:					
Ethan	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
Prosper	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
CpC*:					
Clarno	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Ethan	Severe: percs slowly.	Severe: slope.	Slight	Slight	Good.
Prosper	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
CrA*:					
Clarno	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Prosper	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
DaA	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Davis					
DaB	Moderate: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
Davis					
Dc	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
Davison					
DeC	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones, seepage, too sandy.
Delmont					
DgA*:					
Delmont	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones, seepage, too sandy.
Enet	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
DkD*:					
Delmont	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones, seepage, too sandy.
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
DmD*:					
Delmont	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones, seepage, too sandy.
Talmo	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
DpA*:					
Dudley	Severe: percs slowly.	Slight	Severe: excess sodium.	Slight	Poor: hard to pack, excess sodium.
Jerauld	Severe: percs slowly.	Slight	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
Du	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Dx*:					
Durrstein	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Egas	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: too clayey, wetness, flooding.	Severe: flooding, wetness.	Poor: too clayey, wetness, hard to pack.
Dz*:					
Durrstein Variant	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, excess sodium.
Artesian	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
EaB*:					
Eakin	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EaB*:					
Ethan	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
Onita	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
EnA	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Enet					
EpB*:					
Enet	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Delmont	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones, seepage, too sandy.
EtD*:					
Ethan	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Betts	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Fa*:					
Farmsworth	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, excess sodium.
Artesian	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
Fd*:					
Farmsworth	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, excess sodium.
Lane	Severe: percs slowly.	Slight	Severe: too clayey.	Moderate: flooding.	Poor: too clayey, hard to pack.
Fe	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Fedora					
GpD*:					
Gettys	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GpD*:					
Peno	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
HaB*:					
Hand	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Ethan	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
Prosper	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
HaC*:					
Hand	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Ethan	Severe: percs slowly.	Severe: slope.	Slight	Slight	Good.
Prosper	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
HcA*:					
Hand	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Prosper	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
HeB	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
Henkin					
HfD	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Henkin Variant					
HhA*:					
Highmore	Slight	Moderate: seepage.	Slight	Slight	Good.
Onita	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
HlA*:					
Homme	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Poor: hard to pack.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HlA*:					
Onita	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
Beadle	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
HpB*:					
Homme	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Poor: hard to pack.
Peno	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
HpC*:					
Homme	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Poor: hard to pack.
Peno	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
HrA*:					
Houdek	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Dudley	Severe: percs slowly.	Slight	Severe: excess sodium.	Slight	Poor: hard to pack, excess sodium.
HtB*:					
Houdek	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Dudley	Severe: percs slowly.	Moderate: slope.	Severe: excess sodium.	Slight	Poor: hard to pack, excess sodium.
Jerauld	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
HwB*, HwC*:					
Houdek	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Ethan	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
Prosper	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HyA*:					
Houdek	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Prosper	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
Ln Lane	Severe: percs slowly.	Slight	Severe: too clayey.	Moderate: flooding.	Poor: too clayey, hard to pack.
Lw Lawet	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
On Onita	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
Op*:					
Onita	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
Plankinton	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
PgC*:					
Peno	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Gettys	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Ph*. Pits					
Pk Plankinton	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Pr*:					
Plankinton	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Crossplain	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ReA, ReB---------- Ree	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight----------	Fair: too clayey, thin layer.
RnA*, RnB*: Ree----------	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight----------	Fair: too clayey, thin layer.
Canning----------	Severe: poor filter.	Severe: seepage.	Severe: too sandy, seepage.	Severe: seepage.	Poor: too sandy, small stones.
Te---------- Tetonka	Severe: percs slowly, ponding.	Slight----------	Severe: ponding, too clayey.	Severe: ponding.	Poor: ponding, too clayey, hard to pack.
Wo---------- Worthing	Severe: percs slowly, ponding.	Slight----------	Severe: too clayey, ponding.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Wp---------- Worthing	Severe: percs slowly, ponding.	Severe: ponding.	Severe: too clayey, ponding.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ad Alwilda	Good	Probable	Probable	Poor: area reclaim.
Af Arlo	Poor: wetness.	Probable	Probable	Poor: area reclaim, wetness.
Ar Artesian	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
At*: Artesian	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Bullcreek	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Av*: Artesian	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Durrstein Variant	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Ba Baltic	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
BdA, BdB Beadle	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BgB*: Beadle	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Jerauld	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Dudley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
BlB*: Beadle	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BlB*:				
Lane	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BmD*:				
Betts	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
BoE*:				
Betts	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Ethan	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Br	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Bon				
Bv	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Bon				
CdB*:				
Canning	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, area reclaim.
Delmont	Good	Probable	Probable	Poor: small stones, area reclaim.
Cm	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Clamo				
CpB*, CpC*:				
Clarno	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
CrA*:				
Clarno	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
DaA, DaB Davis	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Dc Davison	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
DeC Delmont	Good	Probable	Probable	Poor: small stones, area reclaim.
DgA*: Delmont	Good	Probable	Probable	Poor: small stones, area reclaim.
Enet	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
DkD*: Delmont	Good	Probable	Probable	Poor: small stones, area reclaim.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
DmD*: Delmont	Good	Probable	Probable	Poor: small stones, area reclaim.
Talmo	Good	Probable	Probable	Poor: small stones, area reclaim.
DpA*: Dudley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Jerauld	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Du Durrstein	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.
Dx*: Durrstein	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Dx*:				
Egas	Poor: shrink-swell, wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.
Dz*:				
Durrstein Variant	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Artesian	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
EaB*:				
Eakin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Onita	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
EnA Enet	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
EpB*:				
Enet	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Delmont	Good	Probable	Probable	Poor: small stones, area reclaim.
EtD*:				
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
Betts	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Fa*:				
Farmsworth	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium, too clayey, excess salt.
Artesian	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Fd*:				
Farmsworth	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium, too clayey, excess salt.
Lane	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Fe Fedora	Fair: wetness.	Probable	Probable	Fair: area reclaim.
GpD*:				
Gettys	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Peno	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
HaB*, HaC*:				
Hand	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
HcA*:				
Hand	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
HeB Henkin	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
HfD Henkin Variant	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
HhA*:				
Highmore	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Onita	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
HlA*:				
Homme	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HlA*:				
Onita	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Beadle	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HpB*, HpC*:				
Homme	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Peno	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
HrA*:				
Houdek	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Dudley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
HtB*:				
Houdek	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Dudley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Jerauld	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
HwB*, HwC*:				
Houdek	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Ethan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
HyA*:				
Houdek	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Prosper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Ln	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Lane				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Lw Lawet	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
On Onita	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Op*: Onita	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Plankinton	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
PgC*: Peno	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Gettys	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Ph*. Pits				
Pk Plankinton	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Pr*: Plankinton	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Crossplain	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
ReA, ReB Ree	Good	Probable	Probable	Fair: too clayey, small stones, area reclaim.
RnA*, RnB*: Ree	Good	Probable	Probable	Fair: too clayey, small stones, area reclaim.
Canning	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, area reclaim.
Te Tetonka	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wo Worthing	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
Wp Worthing	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ad Alwilda	Severe: seepage.	Severe: seepage.	Deep to water	Rooting depth	Too sandy	Rooting depth.
Af Arlo	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, frost action, cutbanks cave.	Wetness, rooting depth, flooding.	Wetness, too sandy.	Wetness, rooting depth.
Ar Artesian	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
At*: Artesian	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Bullcreek	Slight	Severe: hard to pack.	Deep to water	Droughty, slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, droughty.
Av*: Artesian	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Durrstein Variant	Slight	Severe: hard to pack, excess sodium.	Deep to water	Droughty, percs slowly, erodes easily.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
Ba Baltic	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
BdA Beadle	Slight	Severe: hard to pack.	Deep to water	Percs slowly	Erodes easily	Erodes easily, percs slowly.
BdB Beadle	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily	Erodes easily, percs slowly.
BgB*: Beadle	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily	Erodes easily, percs slowly.
Jerauld	Slight	Severe: hard to pack, excess sodium.	Deep to water	Droughty	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
Dudley	Slight	Severe: excess sodium.	Deep to water	Percs slowly, excess sodium.	Percs slowly, erodes easily.	Excess sodium, percs slowly, erodes easily.
BlB*: Beadle	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily	Erodes easily, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
BlB*:						
Lane	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
BmD*:						
Betts	Severe: slope.	Moderate: piping, large stones.	Deep to water	Slope, large stones.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
Ethan	Severe: slope.	Moderate: piping, large stones.	Deep to water	Slope	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
BoE*:						
Betts	Severe: slope.	Slight	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
Ethan	Severe: slope.	Slight	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
Br	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
Bon						
Bv	Moderate: seepage.	Moderate: piping.	Flooding, frost action.	Wetness, flooding.	Wetness	Favorable.
Bon						
CdB*:						
Canning	Severe: seepage.	Severe: seepage.	Deep to water	Favorable	Too sandy	Favorable.
Delmont	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Too sandy	Droughty.
Cm	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Clamo						
CpB*, CpC*:						
Clarno	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, excess salt.	Erodes easily	Erodes easily.
Ethan	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
Prosper	Moderate: seepage.	Moderate: piping.	Deep to water	Flooding	Favorable	Favorable.
CrA*:						
Clarno	Moderate: seepage.	Moderate: piping.	Deep to water	Excess salt	Erodes easily	Erodes easily.
Prosper	Moderate: seepage.	Moderate: piping.	Deep to water	Flooding	Favorable	Favorable.
DaA	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Favorable	Favorable.
Davis						

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
DaB---------- Davis	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----------	Favorable------	Favorable.
Dc---------- Davison	Moderate: seepage.	Severe: piping.	Frost action---	Wetness--------	Erodes easily, wetness.	Erodes easily.
DeC---------- Delmont	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Too sandy------	Droughty.
DgA*:						
Delmont----------	Severe: seepage.	Severe: seepage.	Deep to water	Droughty-------	Too sandy------	Droughty.
Enet----------	Severe: seepage.	Severe: seepage.	Deep to water	Favorable------	Too sandy------	Favorable.
DkD*:						
Delmont----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, too sandy.	Droughty, slope.
Ethan----------	Severe: slope.	Slight---------	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
DmD*:						
Delmont----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, too sandy.	Droughty, slope.
Talmo----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, too sandy.	Slope, droughty.
DpA*:						
Dudley----------	Slight---------	Severe: excess sodium.	Deep to water	Percs slowly, excess sodium.	Percs slowly, erodes easily.	Excess sodium, percs slowly, erodes easily.
Jerauld----------	Slight---------	Severe: hard to pack, excess sodium.	Deep to water	Droughty-------	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
Du---------- Durrstein	Slight---------	Severe: hard to pack, wetness, excess sodium.	Percs slowly, flooding, excess salt.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, excess salt, excess sodium.
Dx*:						
Durrstein--------	Slight---------	Severe: hard to pack, wetness, excess sodium.	Percs slowly, flooding, excess salt.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, excess salt, excess sodium.
Egas----------	Slight---------	Severe: hard to pack, wetness, excess salt.	Percs slowly, flooding, frost action.	Wetness, slow intake, excess salt.	Wetness, percs slowly.	Excess salt, wetness, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Dz*:						
Durrstein Variant	Slight	Severe: hard to pack, excess sodium.	Deep to water	Droughty, percs slowly, erodes easily.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
Artesian	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
EaB*:						
Eakin	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
Ethan	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
Onita	Slight	Moderate: hard to pack, piping, wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Erodes easily.
EnA	Severe: seepage.	Severe: seepage.	Deep to water	Favorable	Too sandy	Favorable.
Enet						
EpB*:						
Enet	Severe: seepage.	Severe: seepage.	Deep to water	Slope	Too sandy	Favorable.
Delmont	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Too sandy	Droughty.
EtD*:						
Ethan	Severe: slope.	Slight	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
Betts	Severe: slope.	Slight	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
Fa*:						
Farmsworth	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, excess sodium, erodes easily.	Percs slowly, erodes easily.	Excess sodium, erodes easily, percs slowly.
Artesian	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Fd*:						
Farmsworth	Slight	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, excess sodium, erodes easily.	Percs slowly, erodes easily.	Excess sodium, erodes easily, percs slowly.
Lane	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Fe	Severe: seepage.	Severe: piping, wetness.	Frost action	Wetness	Wetness	Wetness.
Fedora						

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
GpD*:						
Gettys	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
Peno	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, excess salt.	Slope	Slope.
HaB*, HaC*:						
Hand	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
Ethan	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
Prosper	Moderate: seepage.	Moderate: piping.	Deep to water	Flooding	Favorable	Favorable.
HcA*:						
Hand	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
Prosper	Moderate: seepage.	Moderate: piping.	Deep to water	Flooding	Favorable	Favorable.
HeB Henkin	Severe: seepage.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
HfD Henkin Variant	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
HhA*:						
Highmore	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Onita	Slight	Moderate: hard to pack, piping, wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Erodes easily.
HlA*:						
Homme	Slight	Moderate: hard to pack.	Deep to water	Favorable	Favorable	Favorable.
Onita	Slight	Moderate: hard to pack, piping, wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Erodes easily.
Beadle	Slight	Severe: hard to pack.	Deep to water	Percs slowly	Erodes easily	Erodes easily, percs slowly.
HpB*, HpC*:						
Homme	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope	Favorable	Favorable.
Peno	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, excess salt.	Favorable	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
HrA*:						
Houdek	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Dudley	Slight	Severe: excess sodium.	Deep to water	Percs slowly, excess sodium.	Percs slowly, erodes easily.	Excess sodium, percs slowly, erodes easily.
HtB*:						
Houdek	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Dudley	Moderate: slope.	Severe: excess sodium.	Deep to water	Percs slowly, slope, excess sodium.	Percs slowly, erodes easily.	Excess sodium, percs slowly, erodes easily.
Jerauld	Moderate: slope.	Severe: hard to pack, excess sodium.	Deep to water	Slope, droughty.	Erodes easily, percs slowly.	Excess sodium, erodes easily, droughty.
HwB*, HwC*:						
Houdek	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Ethan	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
Prosper	Moderate: seepage.	Moderate: piping.	Deep to water	Flooding	Favorable	Favorable.
HyA*:						
Houdek	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
Prosper	Moderate: seepage.	Moderate: piping.	Deep to water	Flooding	Favorable	Favorable.
Ln Lane	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Lw Lawet	Severe: seepage.	Severe: wetness.	Frost action	Wetness	Wetness	Wetness.
On Onita	Slight	Moderate: hard to pack, piping, wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Erodes easily.
Op*:						
Onita	Slight	Moderate: hard to pack, piping, wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Erodes easily.
Plankinton	Slight	Severe: ponding.	Ponding, percs slowly.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
PgC*:						
Peno	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, excess salt.	Favorable	Favorable.
Gettys	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
Ph*.						
Pits						
Pk	Slight	Severe: ponding.	Ponding, percs slowly.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Plankinton						
Pr*:						
Plankinton	Slight	Severe: ponding.	Ponding, percs slowly.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Crossplain	Slight	Severe: wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
ReA	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable	Favorable	Favorable.
Ree						
ReB	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Slope	Favorable	Favorable.
Ree						
RnA*:						
Ree	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable	Favorable	Favorable.
Canning	Severe: seepage.	Severe: seepage.	Deep to water	Favorable	Too sandy	Favorable.
RnB*:						
Ree	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Slope	Favorable	Favorable.
Canning	Severe: seepage.	Severe: seepage.	Deep to water	Favorable	Too sandy	Favorable.
Te	Slight	Severe: ponding, hard to pack.	Percs slowly, ponding, frost action.	Percs slowly, ponding.	Ponding, percs slowly.	Wetness, percs slowly.
Tetonka						
Wo	Slight	Severe: hard to pack, ponding.	Ponding, frost action, percs slowly.	Ponding, percs slowly.	Ponding, percs slowly, erodes easily.	Wetness, percs slowly.
Worthing						
Wp	Slight	Severe: hard to pack, ponding.	Percs slowly, ponding, frost action.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Worthing						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
Ad	0-7	Loam	ML, CL-ML, CL	A-4, A-6	0	100	100	85-100	55-20	25-40	3-15
Alwilda	7-20	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	75-100	35-50	20-30	NP-7
	20-29	Loamy fine sand, loamy sand.	SM, SM-SC	A-2	0	100	100	50-100	15-35	<25	NP-5
	29-60	Gravelly sand, gravelly loamy sand, very gravelly sand.	SP-SM, SW-SM, SM-SC	A-1, A-2, A-3	0	60-90	45-80	25-70	5-30	<25	NP-5
Af	0-7	Loam	ML, CL	A-6, A-7	0	100	95-100	85-100	60-85	35-50	10-25
Arlo	7-18	Loam, clay loam	ML, CL	A-6, A-7	0	95-100	90-100	70-100	55-85	30-50	10-30
	18-32	Loam, sandy clay loam, clay loam.	ML, CL, SC, SM	A-4, A-6, A-7	0	95-100	90-100	60-95	40-75	30-45	5-20
	32-60	Stratified loamy sand to very gravelly sand.	GM, SM, GP-GM, SP-SM	A-2, A-1, A-3	0-5	60-100	40-95	35-65	5-35	<35	NP-10
Ar	0-7	Silty clay	CH, CL	A-7	0	100	100	95-100	80-95	40-60	15-30
Artesian	7-17	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	85-95	50-70	20-40
	17-60	Clay, silty clay, clay loam.	CH, MH	A-7	0	100	100	90-100	70-90	50-85	20-50
At*:											
Artesian	0-7	Silty clay	CH, CL	A-7	0	100	100	95-100	80-95	40-60	15-30
	7-17	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	85-95	50-70	20-40
	17-60	Clay, silty clay, clay loam.	CH, MH	A-7	0	100	100	90-100	70-90	50-85	20-50
Bullcreek	0-4	Clay	MH, CH	A-7	0	95-100	95-100	90-100	85-100	60-100	30-60
	4-9	Clay	MH, CH	A-7	0	95-100	95-100	90-100	85-100	70-100	35-60
	9-16	Clay	MH, CH	A-7	0	95-100	95-100	90-100	85-100	70-100	35-60
	16-60	Clay	CH	A-7	0	95-100	95-100	90-100	85-100	70-100	40-60
Av*:											
Artesian	0-7	Silty clay	CH, CL	A-7	0	100	100	95-100	80-95	40-60	15-30
	7-17	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	85-95	50-70	20-40
	17-60	Clay, silty clay, clay loam.	CH, MH	A-7	0	100	100	90-100	70-90	50-85	20-50
Durrstein Variant	0-3	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	20-35	3-15
	3-16	Silty clay, clay, clay loam.	CH, MH	A-7	0	95-100	95-100	85-100	65-95	50-85	20-50
	16-60	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	85-100	60-95	40-75	15-50
Ba	0-8	Silty clay	CH, MH	A-7	0	100	100	90-100	85-100	50-65	20-35
Baltic	8-26	Silty clay, clay, silty clay loam.	CH, MH	A-7	0	100	95-100	90-100	85-100	50-70	20-40
	26-60	Silty clay, silty clay loam, clay loam.	CL, CH, MH, ML	A-6, A-7	0	100	95-100	80-100	65-100	35-70	15-35

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
BdA, BdB---------- Beadle	0-5	Loam----------	CL, ML, CL-ML	A-6, A-7, A-4	0-5	95-100	95-100	85-100	65-95	25-45	5-20
	5-45	Clay loam, clay	CL, CH	A-7	0-5	90-100	85-100	75-95	55-95	40-60	15-35
	45-60	Clay loam, clay	CL, CH, ML, MH	A-6, A-7	0-5	90-100	85-100	75-95	55-85	35-55	15-25
BgB*:											
Beadle----------	0-5	Loam----------	CL, ML, CL-ML	A-6, A-7, A-4	0-5	95-100	95-100	85-100	65-95	25-45	5-20
	5-45	Clay loam, clay	CL, CH	A-7	0-5	90-100	85-100	75-95	55-95	40-60	15-35
	45-60	Clay loam, clay	CL, CH, ML, MH	A-6, A-7	0-5	90-100	85-100	75-95	55-85	35-55	15-25
Jerauld----------	0-3	Loam----------	CL, CL-ML	A-4, A-6	0	100	100	90-100	60-100	25-40	5-15
	3-9	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-95	45-70	20-40
	9-17	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-95	45-70	20-40
	17-60	Silty clay, clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	55-90	40-85	20-45
Dudley----------	0-6	Silt loam--------	CL, ML	A-6, A-7	0	95-100	95-100	90-100	65-90	35-45	10-20
	6-21	Clay loam, silty clay loam, clay.	CL, CH, MH	A-7	0	95-100	95-100	85-100	65-85	40-60	15-35
	21-45	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7	0	95-100	95-100	85-100	65-85	35-60	15-35
	45-60	Loam, clay loam	CL, CH	A-6, A-7	0	95-100	90-100	80-100	55-80	30-60	11-35
BlB*:											
Beadle----------	0-5	Loam----------	CL, ML, CL-ML	A-6, A-7, A-4	0-5	95-100	95-100	85-100	65-95	25-45	5-20
	5-45	Clay loam, clay	CL, CH	A-7	0-5	90-100	85-100	75-95	55-95	40-60	15-35
	45-60	Clay loam, clay	CL, CH, ML, MH	A-6, A-7	0-5	90-100	85-100	75-95	55-85	35-55	15-25
Lane----------	0-8	Silty clay loam	CL, MH, ML, CH	A-6, A-7	0	100	100	95-100	85-100	35-55	11-25
	8-30	Silty clay, clay, silty clay loam.	CL, CH, MH, ML	A-7	0	100	95-100	90-100	75-100	45-65	15-35
	30-60	Silty clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	100	95-100	85-100	65-100	35-65	15-40
BmD*:											
Betts----------	0-2	Stony loam-------	CL, CL-ML	A-4, A-6	10-25	100	90-100	85-100	60-75	25-40	5-15
	2-22	Loam, clay loam, stony clay loam.	CL	A-6, A-7	5-20	100	90-100	85-100	50-85	30-45	10-20
	22-60	Loam, clay loam, stony clay loam.	CL	A-6, A-7	5-20	100	90-100	85-100	50-85	30-45	10-20
Ethan----------	0-4	Stony loam-------	CL, CL-ML	A-4, A-6	20-50	95-100	90-100	80-95	55-80	25-40	5-15
	4-36	Loam, clay loam	CL	A-6, A-7, A-4	0-5	95-100	95-100	85-100	55-80	30-45	8-20
	36-60	Loam, clay loam	CL	A-6, A-7, A-4	0-5	90-100	85-100	75-100	50-85	30-50	8-25

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
BoE*:											
Betts	0-2	Loam	CL, CL-ML	A-4, A-6	0-5	90-100	80-100	75-100	60-75	20-38	5-15
	2-22	Loam, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
	22-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
Ethan	0-8	Loam	CL, ML	A-4, A-6	0	95-100	90-100	80-100	55-100	30-40	5-15
	8-22	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	22-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Br	0-40	Loam	CL-ML, CL	A-4, A-6	0	100	95-100	80-95	55-85	25-40	5-15
Bon	40-52	Stratified silty clay loam to fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	80-95	60-85	25-40	3-15
	52-60	Stratified silty clay loam to loamy fine sand.	ML, SM, SC, CL	A-4, A-6, A-7	0	95-100	95-100	75-95	45-95	25-45	3-22
Bv	0-40	Loam	CL-ML, CL	A-4, A-6	0	100	90-100	80-95	60-85	25-40	5-15
Bon	40-52	Stratified silty clay loam to fine sandy loam.	CL, CL-ML, ML	A-4, A-6	0	100	95-100	80-95	60-85	25-40	3-15
	52-60	Stratified silty clay loam to fine sandy loam.	ML, SM, CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	75-95	45-95	25-45	3-22
CdB*:											
Canning	0-7	Loam	CL	A-4, A-6	0	100	100	85-100	50-90	30-40	8-15
	7-33	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0	95-100	85-100	60-90	35-80	30-45	10-20
	33-60	Gravelly sand, very gravelly sand, very gravelly loamy sand.	SM, SM-SC, GM, GM-GC	A-1, A-2, A-3	0	40-100	30-80	15-70	5-30	<25	NP-5
Delmont	0-8	Loam	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	8-15	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SM-SC	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	15-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SM, SW-SM, SM-SC, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	<25	NP-5
Cm	0-8	Silty clay loam	CL, CH	A-7	0	100	95-100	90-100	85-100	45-65	20-35
Clamo	8-60	Silty clay loam, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	100	95-100	90-100	85-100	45-75	20-40
CpB*, CpC*:											
Clarno	0-7	Loam	CL, CL-ML, ML	A-4, A-6	0	100	95-100	85-100	55-90	25-40	5-20
	7-14	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	14-39	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	39-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
CpB*, CpC*:											
Ethan	0-8	Loam	CL, ML	A-4, A-6	0	95-100	90-100	80-100	55-100	30-40	5-15
	8-22	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	22-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Prosper	0-10	Loam	CL	A-4, A-6	0	95-100	95-100	85-100	60-90	25-40	8-20
	10-27	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	27-41	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	41-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
CrA*:											
Clarno	0-7	Loam	CL, CL-ML, ML	A-4, A-6	0	100	95-100	85-100	55-90	25-40	5-20
	7-14	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	14-39	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
	39-60	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-85	30-45	10-20
Prosper	0-10	Loam	CL	A-4, A-6	0	95-100	95-100	85-100	60-90	25-40	8-20
	10-27	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	27-41	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	41-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
DaA, DaB	0-9	Loam	CL, ML	A-6, A-7, A-4	0	100	90-100	80-100	60-85	30-45	5-20
Davis	9-34	Loam, silt loam, clay loam.	CL, ML	A-6, A-7	0	100	90-100	80-100	60-85	35-45	10-20
	34-60	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0	100	95-100	85-100	55-90	30-45	10-20
Dc	0-10	Loam	CL	A-6	0	95-100	95-100	85-95	60-85	25-40	10-20
Davison	10-18	Loam, clay loam, sandy loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0-5	95-100	95-100	85-100	45-80	25-40	5-20
	18-32	Loam, clay loam	CL-ML, CL	A-4, A-6	0-5	95-100	95-100	85-100	60-80	25-40	5-20
	32-60	Stratified clay loam to sandy loam.	CL-ML, SC, CL, SM-SC	A-4, A-6	0-5	90-100	80-100	65-95	40-75	20-35	5-15
DeC	0-8	Loam	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
Delmont	8-15	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SM-SC	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	15-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SM, SW-SM, SM-SC, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	<25	NP-5
DgA*:											
Delmont	0-8	Loam	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	8-15	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SM-SC	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	15-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SM, SW-SM, SM-SC, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	<25	NP-5

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
DgA*:											
Enet	0-7	Loam	ML, CL	A-4, A-6	0	90-100	85-100	70-95	55-80	30-40	5-15
	7-14	Loam, clay loam, sandy clay loam.	CL, ML, SC, SM	A-4, A-6	0	90-100	85-100	70-95	45-75	30-40	5-15
	14-25	Loam, fine sandy loam, sandy loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	85-95	60-95	40-75	20-40	3-15
	25-60	Very gravelly loamy sand, gravelly sand, very gravelly sand.	SW, SW-SM, SM, SM-SC	A-1, A-2, A-3	0	60-95	45-90	10-60	0-15	<25	NP-5
DkD*:											
Delmont	0-8	Loam	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	8-15	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SM-SC	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	15-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SM, SW-SM, SM-SC, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	<25	NP-5
Ethan	0-8	Loam	CL, ML	A-4, A-6	0	95-100	90-100	80-100	55-100	30-40	5-15
	8-22	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	22-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
DmD*:											
Delmont	0-8	Loam	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	8-15	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SM-SC	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	15-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SM, SW-SM, SM-SC, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	<25	NP-5
Talmo	0-7	Loam	ML, CL	A-4, A-6	0-5	95-100	90-100	85-100	55-75	30-40	5-15
	7-60	Extremely gravelly sand, very gravelly sand, very gravelly loamy sand.	GW, GM, SW, SM	A-2, A-1	0-10	40-95	30-65	15-35	0-35	<25	NP-5
DpA*:											
Dudley	0-6	Silt loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	65-90	35-45	10-20
	6-21	Clay loam, silty clay loam, clay.	CL, CH, MH	A-7	0	95-100	95-100	85-100	65-85	40-60	15-35
	21-45	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7	0	95-100	95-100	85-100	65-85	35-60	15-35
	45-60	Loam, clay loam	CL, CH	A-6, A-7	0	95-100	90-100	80-100	55-80	30-60	11-35

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
DpA*:											
Jerauld	0-3	Loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	60-100	25-40	5-15
	3-9	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-95	45-70	20-40
	9-17	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-95	45-70	20-40
	17-60	Silty clay, clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	55-90	40-85	20-45
Du	0-1	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	20-35	3-15
Durrstein	1-16	Silty clay, clay, clay loam.	CH, MH	A-7	0	95-100	95-100	85-100	65-95	50-85	20-50
	16-60	Silty clay, silty clay loam, clay loam.	CH, CL	A-7	0	95-100	95-100	85-100	60-95	40-75	15-50
Dx*:											
Durrstein	0-1	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	20-35	3-15
	1-16	Silty clay, clay, clay loam.	CH, MH	A-7	0	95-100	95-100	85-100	65-95	50-85	20-50
	16-60	Silty clay, silty clay loam, clay loam.	CH, CL	A-7	0	95-100	95-100	85-100	60-95	40-75	15-50
Egas	0-34	Silty clay	CH, MH	A-7	0	100	100	95-100	90-100	50-90	22-55
	34-60	Silty clay, silty clay loam, clay.	CH, MH	A-7	0	100	100	90-100	85-100	50-90	22-50
Dz*:											
Durrstein Variant	0-3	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	20-35	3-15
	3-16	Silty clay, clay, clay loam.	CH, MH	A-7	0	95-100	95-100	85-100	65-95	50-85	20-50
	16-60	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	85-100	60-95	40-75	15-50
Artesian	0-7	Silty clay	CH, CL	A-7	0	100	100	95-100	80-95	40-60	15-30
	7-17	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	85-95	50-70	20-40
	17-60	Clay, silty clay, clay loam.	CH, MH	A-7	0	100	100	90-100	70-90	50-85	20-50
EaB*:											
Eakin	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	5-20
	7-39	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	95-100	80-100	35-50	10-25
	39-60	Clay loam, loam, clay	CL, CH	A-7	0	95-100	85-100	75-100	60-95	40-70	16-42
Ethan	0-8	Loam	CL, ML	A-4, A-6	0	95-100	90-100	80-100	55-100	30-40	5-15
	8-22	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	22-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
EaB*:											
Onita	0-17	Silt loam	CL, ML	A-4, A-6, A-7	0	100	95-100	90-100	70-100	30-45	7-20
	17-29	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	75-100	40-60	15-35
	29-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
EnA	0-7	Loam	ML, CL	A-4, A-6	0	90-100	85-100	70-95	55-80	30-40	5-15
Enet	7-14	Loam, clay loam, sandy clay loam.	CL, ML, SC, SM	A-4, A-6	0	90-100	85-100	70-95	45-75	30-40	5-15
	14-25	Loam, fine sandy loam, sandy loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	85-95	60-95	40-75	20-40	3-15
	25-60	Very gravelly loamy sand, gravelly sand, very gravelly sand.	SW, SW-SM, SM, SM-SC	A-1, A-2, A-3	0	60-95	45-90	10-60	0-15	<25	NP-5
EpB*:											
Enet	0-7	Loam	ML, CL	A-4, A-6	0	90-100	85-100	70-95	55-80	30-40	5-15
	7-14	Loam, clay loam, sandy clay loam.	CL, ML, SC, SM	A-4, A-6	0	90-100	85-100	70-95	45-75	30-40	5-15
	14-25	Loam, fine sandy loam, sandy loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	85-95	60-95	40-75	20-40	3-15
	25-60	Very gravelly loamy sand, gravelly sand, very gravelly sand.	SW, SW-SM, SM, SM-SC	A-1, A-2, A-3	0	60-95	45-90	10-60	0-15	<25	NP-5
Delmont	0-8	Loam	CL	A-6, A-4	0	90-100	90-100	80-95	60-75	28-40	8-20
	8-15	Loam, fine sandy loam, sandy loam.	SC, CL, CL-ML, SM-SC	A-4, A-6	0	80-100	70-100	50-100	35-70	20-40	5-18
	15-60	Very gravelly sand, very gravelly loamy sand, gravelly sand.	SM, SW-SM, SM-SC, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	<25	NP-5
EtD*:											
Ethan	0-8	Loam	CL, ML	A-4, A-6	0	95-100	90-100	80-100	55-100	30-40	5-15
	8-22	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	22-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Betts	0-2	Loam	CL, CL-ML	A-4, A-6	0-5	90-100	80-100	75-100	60-75	20-38	5-15
	2-22	Loam, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25
	22-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	50-85	30-45	10-25

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Fa*:											
Farmsworth	0-10	Silt loam	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	25-40	3-15
	10-25	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	85-95	50-70	20-40
	25-60	Clay, silty clay, clay loam.	CH, MH	A-7	0	95-100	95-100	85-100	80-95	50-65	20-35
Artesian	0-7	Silty clay	CH, CL	A-7	0	100	100	95-100	80-95	40-60	15-30
	7-17	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	85-95	50-70	20-40
	17-60	Clay, silty clay, clay loam.	CH, MH	A-7	0	100	100	90-100	70-90	50-85	20-50
Fd*:											
Farmsworth	0-10	Silt loam	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	25-40	3-15
	10-25	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	85-95	50-70	20-40
	25-60	Clay, silty clay, clay loam.	CH, MH	A-7	0	95-100	95-100	85-100	80-95	50-65	20-35
Lane	0-8	Silty clay loam	CL, MH, ML, CH	A-6, A-7	0	100	100	95-100	85-100	35-55	11-25
	8-30	Silty clay, clay, silty clay loam.	CL, CH, MH, ML	A-7	0	100	95-100	90-100	75-100	45-65	15-35
	30-60	Silty clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	100	95-100	85-100	65-100	35-65	15-40
Fe	0-14	Loam	ML, CL-ML, CL	A-4	0	95-100	95-100	85-100	55-70	25-35	5-10
Fedora	14-25	Sandy loam, fine sandy loam, loamy sand.	SC, SM, SM-SC	A-4, A-2	0	95-100	95-100	65-100	25-45	15-30	NP-10
	25-36	Sandy loam, loam, fine sandy loam.	CL, SC, SM-SC, CL-ML	A-4, A-6	0	95-100	95-100	60-95	35-65	20-35	5-15
	36-60	Loamy fine sand, fine sand, gravelly sand.	SM, SP-SM, SM-SC	A-1, A-2, A-3	0	60-100	50-100	30-75	5-25	<25	NP-5
GpD*:											
Gettys	0-4	Clay loam	CL, CH	A-7	0	95-100	90-100	85-100	70-85	40-60	15-30
	4-28	Clay loam, clay	CL, CH	A-7	0	95-100	90-100	85-100	60-80	40-60	15-30
	28-60	Clay loam, clay	CL, CH, MH	A-7	0	95-100	90-100	85-100	60-80	40-60	20-35
Peno	0-3	Loam	ML, CL	A-6, A-7, A-4	0-5	95-100	95-100	85-95	60-75	30-45	5-20
	3-10	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	85-95	70-85	40-65	15-35
	10-60	Clay loam, clay	CL, CH, ML	A-7	0-5	95-100	95-100	85-95	70-85	45-80	20-45
HaB*, HaC*:											
Hand	0-9	Loam	CL, CL-ML	A-4, A-6	0	95-100	85-100	75-100	50-85	25-40	5-20
	9-15	Loam, silt loam	CL, CL-ML	A-4, A-6	0	95-100	85-100	75-100	50-85	25-40	5-20
	15-31	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	95-100	80-100	75-100	50-80	25-40	5-20
	31-60	Stratified silt loam to fine sandy loam.	CL, CL-ML	A-4, A-6	0-5	95-100	80-100	70-100	50-80	25-40	5-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
HaB*, HaC*:											
Ethan	0-8	Loam	CL, ML	A-4, A-6	0	95-100	90-100	80-100	55-100	30-40	5-15
	8-22	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	22-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Prosper	0-10	Loam	CL	A-4, A-6	0	95-100	95-100	85-100	60-90	25-40	8-20
	10-27	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	27-41	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	41-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
HcA*:											
Hand	0-9	Loam	CL, CL-ML	A-4, A-6	0	95-100	85-100	75-100	50-85	25-40	5-20
	9-15	Loam, silt loam	CL, CL-ML	A-4, A-6	0	95-100	85-100	75-100	50-85	25-40	5-20
	15-31	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	95-100	80-100	75-100	50-80	25-40	5-20
	31-60	Stratified silt loam to fine sandy loam.	CL, CL-ML	A-4, A-6	0-5	95-100	80-100	70-100	50-80	25-40	5-15
Prosper	0-10	Loam	CL	A-4, A-6	0	95-100	95-100	85-100	60-90	25-40	8-20
	10-27	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	27-41	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	41-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
HeB	0-12	Loam	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	60-70	25-35	5-15
Henkin	12-36	Loam, sandy loam, fine sandy loam.	SM, SC, ML, CL	A-4	0-5	90-100	80-100	65-100	35-60	15-30	NP-10
	36-60	Stratified fine sand to clay loam.	SM, SC, SP-SM, SM-SC	A-2, A-4, A-1, A-3	0-5	90-100	80-100	35-95	5-50	15-35	NP-10
HfD	0-10	Sandy loam	SM, SM-SC	A-4	0	100	100	60-70	35-45	<25	NP-7
Henkin Variant	10-60	Loamy sand, sand	SM, SP-SM, SM-SC	A-2, A-3	0	100	95-100	50-80	5-35	<20	NP-5
HhA*:											
Highmore	0-7	Silt loam	ML, CL	A-4, A-6, A-7	0	100	95-100	95-100	90-100	30-45	5-20
	7-50	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	90-100	85-100	35-50	10-25
	50-60	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	95-100	90-100	85-100	35-50	10-25
Onita	0-17	Silt loam	CL, ML	A-4, A-6, A-7	0	100	95-100	90-100	70-100	30-45	7-20
	17-29	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	75-100	40-60	15-35
	29-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
HlA*:											
Homme	0-8	Silty clay loam	CL	A-6, A-7	0	100	95-100	95-100	85-100	35-45	15-25
	8-25	Silty clay loam	CL, CH	A-7	0	100	95-100	95-100	80-100	40-55	15-30
	25-45	Silty clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	95-100	90-100	80-100	30-50	10-25
	45-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	60-85	30-50	10-25
Onita	0-17	Silt loam	CL, ML	A-4, A-6, A-7	0	100	95-100	90-100	70-100	30-45	7-20
	17-29	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	75-100	40-60	15-35
	29-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
Beadle	0-5	Loam	CL, ML, CL-ML	A-6, A-7, A-4	0-5	95-100	95-100	85-100	65-95	25-45	5-20
	5-45	Clay loam, clay	CL, CH	A-7	0-5	90-100	85-100	75-95	55-95	40-60	15-35
	45-60	Clay loam, clay	CL, CH, ML, MH	A-6, A-7	0-5	90-100	85-100	75-95	55-85	35-55	15-25
HpB*, HpC*:											
Homme	0-8	Silty clay loam	CL	A-6, A-7	0	100	95-100	95-100	85-100	35-45	15-25
	8-25	Silty clay loam	CL, CH	A-7	0	100	95-100	95-100	80-100	40-55	15-30
	25-45	Silty clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	95-100	90-100	80-100	30-50	10-25
	45-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	90-100	85-100	60-85	30-50	10-25
Peno	0-3	Loam	ML, CL	A-6, A-7, A-4	0-5	95-100	95-100	85-95	60-75	30-45	5-20
	3-10	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	85-95	70-85	40-65	15-35
	10-60	Clay loam, clay	CL, CH, ML	A-7	0-5	95-100	95-100	85-95	70-85	45-80	20-45
HrA*:											
Houdek	0-5	Loam	CL	A-4, A-6, A-7	0	95-100	95-100	85-100	60-85	30-45	8-20
	5-14	Clay loam	CL	A-6, A-7	0	95-100	95-100	85-100	60-80	35-50	10-25
	14-25	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	85-100	60-80	35-50	10-25
	25-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-100	55-80	30-50	10-25
Dudley	0-6	Silt loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	65-90	35-45	10-20
	6-21	Clay loam, silty clay loam, clay.	CL, CH, MH	A-7	0	95-100	95-100	85-100	65-85	40-60	15-35
	21-28	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7	0	95-100	95-100	85-100	65-85	35-60	15-35
	28-60	Loam, clay loam	CL, CH	A-6, A-7	0	95-100	90-100	80-100	55-80	30-60	11-35
HtB*:											
Houdek	0-5	Loam	CL	A-4, A-6, A-7	0	95-100	95-100	85-100	60-85	30-45	8-20
	5-14	Clay loam	CL	A-6, A-7	0	95-100	95-100	85-100	60-80	35-50	10-25
	14-25	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	85-100	60-80	35-50	10-25
	25-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-100	55-80	30-50	10-25
Dudley	0-6	Silt loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	65-90	35-45	10-20
	6-21	Clay loam, silty clay loam, clay.	CL, CH, MH	A-7	0	95-100	95-100	85-100	65-85	40-60	15-35
	21-28	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7	0	95-100	95-100	85-100	65-85	35-60	15-35
	28-60	Loam, clay loam	CL, CH	A-6, A-7	0	95-100	90-100	80-100	55-80	30-60	11-35

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
HtB*:											
Jerauld	0-3	Loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	60-100	25-40	5-15
	3-9	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-95	45-70	20-40
	9-17	Silty clay, clay, clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	55-95	45-70	20-40
	17-60	Silty clay, clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	55-90	40-85	20-45
HwB*, HwC*:											
Houdek	0-5	Loam	CL	A-4, A-6, A-7	0	95-100	95-100	85-100	60-85	30-45	8-20
	5-14	Clay loam	CL	A-6, A-7	0	95-100	95-100	85-100	60-80	35-50	10-25
	14-25	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	85-100	60-80	35-50	10-25
	25-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-100	55-80	30-50	10-25
Ethan	0-8	Loam	CL, ML	A-4, A-6	0	95-100	90-100	80-100	55-100	30-40	5-15
	8-22	Loam, clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	55-80	30-50	10-25
	22-60	Loam, clay loam	CL	A-4, A-6, A-7	0-5	90-100	85-100	75-100	50-95	28-45	8-20
Prosper	0-10	Loam	CL	A-4, A-6	0	95-100	95-100	85-100	60-90	25-40	8-20
	10-27	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	27-41	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	41-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
HyA*:											
Houdek	0-5	Loam	CL	A-4, A-6, A-7	0	95-100	95-100	85-100	60-85	30-45	8-20
	5-14	Clay loam	CL	A-6, A-7	0	95-100	95-100	85-100	60-80	35-50	10-25
	14-25	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	85-100	60-80	35-50	10-25
	25-60	Clay loam, loam	CL	A-6, A-7	0-5	90-100	90-100	80-100	55-80	30-50	10-25
Prosper	0-10	Loam	CL	A-4, A-6	0	95-100	95-100	85-100	60-90	25-40	8-20
	10-27	Clay loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	85-100	60-90	35-50	10-25
	27-41	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
	41-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	80-95	55-85	30-50	10-25
Ln	0-8	Silty clay loam	CL, MH, ML, CH	A-6, A-7	0	100	100	95-100	85-100	35-55	11-25
Lane	8-30	Silty clay, clay, silty clay loam.	CL, CH, MH, ML	A-7	0	100	95-100	90-100	75-100	45-65	15-35
	30-60	Silty clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	100	95-100	85-100	65-100	35-65	15-40
Lw	0-7	Loam	CL, CL-ML	A-6, A-4	0	100	100	85-100	50-95	20-40	5-15
Lawet	7-60	Sandy loam, clay loam, loam.	CL, SC	A-6, A-4	0	100	100	70-100	35-75	20-35	8-20
On	0-17	Silt loam	CL, ML	A-4, A-6, A-7	0	100	95-100	90-100	70-100	30-45	7-20
Onita	17-29	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	75-100	40-60	15-35
	29-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Op*:											
Onita	0-17	Silt loam	CL, ML	A-4, A-6, A-7	0	100	95-100	90-100	70-100	30-45	7-20
	17-29	Silty clay loam, clay loam, silty clay.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	75-100	40-60	15-35
	29-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	65-100	30-55	10-30
Plankinton	0-9	Silt loam	ML, CL	A-4, A-6	0	100	100	90-100	80-100	27-40	5-15
	9-39	Clay, silty clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	90-100	70-100	40-70	15-35
	39-60	Clay, silty clay, clay loam.	CH, CL	A-6, A-7	0	95-100	90-100	85-100	65-100	30-60	15-30
PgC*:											
Peno	0-3	Loam	ML, CL	A-6, A-7, A-4	0-5	95-100	95-100	85-95	60-75	30-45	5-20
	3-10	Clay loam, clay	CL, CH	A-7	0-5	95-100	95-100	85-95	70-85	40-65	15-35
	10-60	Clay loam, clay	CL, CH, ML	A-7	0-5	95-100	95-100	85-95	70-85	45-80	20-45
Gettys	0-4	Clay loam	CL, CH	A-7	0	95-100	90-100	85-100	70-85	40-60	15-30
	4-28	Clay loam, clay	CL, CH	A-7	0	95-100	90-100	85-100	60-80	40-60	15-30
	28-60	Clay loam, clay	CL, CH, MH	A-7	0	95-100	90-100	85-100	60-80	40-60	20-35
Ph*. Pits											
Pk	0-9	Silt loam	ML, CL	A-4, A-6	0	100	100	90-100	80-100	27-40	5-15
Plankinton	9-39	Clay, silty clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	90-100	70-100	40-70	15-35
	39-60	Clay, silty clay, clay loam.	CH, CL	A-6, A-7	0	95-100	90-100	85-100	65-100	30-60	15-30
Pr*:											
Plankinton	0-9	Silt loam	ML, CL	A-4, A-6	0	100	100	90-100	80-100	27-40	5-15
	9-39	Clay, silty clay, clay loam.	CH, MH, CL, ML	A-7	0	100	95-100	90-100	70-100	40-70	15-35
	39-60	Clay, silty clay, clay loam.	CH, CL	A-6, A-7	0	95-100	90-100	85-100	65-100	30-60	15-30
Crossplain	0-8	Loam	CL, ML	A-6, A-7	0	100	100	90-100	60-85	30-50	10-20
	8-28	Clay loam, clay	CL, CH	A-7	0	100	95-100	90-100	70-90	40-55	15-30
	28-43	Clay loam, loam	CL	A-6, A-7	0	95-100	95-100	85-100	60-80	30-45	10-25
	43-60	Clay loam, loam	CL	A-6, A-7	0-5	95-100	95-100	85-100	60-80	30-45	10-25
ReA, ReB	0-5	Loam	CL, CL-ML	A-4, A-6	0	100	95-100	80-100	70-95	25-40	5-15
Ree	5-14	Clay loam, sandy clay loam, silty clay loam.	CL	A-6, A-7	0	100	90-100	70-100	65-85	30-45	10-20
	14-37	Clay loam, loam	CL	A-6	0	100	85-100	70-100	55-85	25-40	10-20
	37-53	Clay loam, silty clay, sandy clay loam.	CL, CH	A-7	0	100	95-100	90-100	85-100	40-55	15-30
	53-60	Gravelly sand, gravelly loamy sand, very gravelly sand.	SM, SW-SM, SM-SC, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	<25	NP-5

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
RnA*, RnB*:											
Ree	0-5	Loam	CL, CL-ML	A-4, A-6	0	100	95-100	80-100	70-95	25-40	5-15
	5-14	Clay loam, sandy clay loam, silty clay loam.	CL	A-6, A-7	0	100	90-100	70-100	65-85	30-45	10-20
	14-37	Clay loam, loam	CL	A-6	0	100	85-100	70-100	55-85	25-40	10-20
	37-53	Clay loam, silty clay, sandy clay loam.	CL, CH	A-7	0	100	95-100	90-100	85-100	40-55	15-30
	53-60	Gravelly sand, gravelly loamy sand, very gravelly sand.	SM, SW-SM, SM-SC, SW	A-1, A-2	0-5	60-100	40-80	15-50	3-30	<25	NP-5
Canning	0-7	Loam	CL	A-4, A-6	0	100	100	85-100	50-90	30-40	8-15
	7-33	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0	95-100	85-100	60-90	35-80	30-45	10-20
	33-60	Gravelly sand, very gravelly sand, very gravelly loamy sand.	SM, SM-SC, GM, GM-GC	A-1, A-2, A-3	0	40-100	30-80	15-70	5-30	<25	NP-5
Te	0-15	Silt loam	ML, CL	A-4, A-6, A-7	0	100	100	95-100	80-100	27-50	5-20
Tetonka	15-35	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-7	0	95-100	95-100	85-100	65-100	40-70	15-35
	35-60	Clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	95-100	95-100	80-100	55-95	30-60	11-30
Wo	0-13	Silty clay loam	CL, CH, MH, ML	A-7	0	100	100	95-100	85-100	40-60	15-30
Worthing	13-40	Silty clay, clay	CH, MH	A-7	0	100	100	95-100	85-100	50-70	22-35
	40-60	Silty clay, silty clay loam, clay loam.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	70-100	40-65	15-30
Wp	0-13	Silty clay loam	CL, CH, MH, ML	A-7	0	100	100	95-100	85-100	40-60	15-30
Worthing	13-40	Silty clay, clay	CH	A-7	0	100	100	95-100	80-100	50-70	25-40
	40-60	Silty clay, silty clay loam, clay loam.	CL, CH, ML, MH	A-7	0	100	95-100	90-100	70-100	40-65	15-30

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
Ad	0-7	15-25	0.6-2.0	0.18-0.20	5.6-7.3	<2	Low	0.28	5	6	2-4
Alwilda	7-20	8-15	2.0-6.0	0.11-0.17	5.1-7.3	<2	Low	0.28			
	20-29	5-10	6.0-20	0.10-0.12	6.1-7.8	<2	Low	0.28			
	29-60	2-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.28			
Af	0-7	20-26	0.6-2.0	0.18-0.22	6.6-8.4	<2	Moderate	0.28	5	4L	2-4
Arlo	7-18	20-35	0.6-2.0	0.15-0.19	7.4-8.4	<2	Moderate	0.28			
	18-32	20-30	0.6-2.0	0.13-0.17	7.4-8.4	<4	Low	0.28			
	32-60	3-10	6.0-20	0.03-0.06	7.4-8.4	<4	Low	0.10			
Ar	0-7	40-50	0.06-0.2	0.10-0.18	6.1-7.8	<2	High	0.37	5	4	3-5
Artesian	7-17	45-60	<0.2	0.10-0.14	6.1-7.8	<2	High	0.37			
	17-60	35-50	<0.2	0.10-0.17	7.4-8.4	2-8	High	0.37			
At*:											
Artesian	0-7	40-50	0.06-0.2	0.10-0.18	6.1-7.8	<2	High	0.37	5	4	3-5
	7-17	45-60	<0.2	0.10-0.14	6.1-7.8	<2	High	0.37			
	17-60	35-50	<0.2	0.10-0.17	7.4-8.4	2-8	High	0.37			
Bullcreek	0-4	55-65	<0.06	0.10-0.14	6.6-8.4	<2	Very high	0.37	5	4	2-4
	4-9	60-70	<0.06	0.10-0.14	7.4-9.0	<4	Very high	0.37			
	9-16	60-70	<0.06	0.08-0.12	7.4-9.0	4-16	Very high	0.37			
	16-60	60-70	<0.06	0.08-0.12	7.4-9.0	4-16	Very high	0.37			
Av*:											
Artesian	0-7	40-50	0.06-0.2	0.10-0.18	6.1-7.8	<2	High	0.37	5	4	3-5
	7-17	45-60	<0.2	0.10-0.14	6.1-7.8	<2	High	0.37			
	17-60	35-50	<0.2	0.10-0.17	7.4-8.4	2-8	High	0.37			
Durrstein Variant	0-3	10-26	0.6-2.0	0.17-0.20	6.1-7.3	4-16	Low	0.37	3	6	1-3
	3-16	35-60	<0.2	0.10-0.15	6.6-9.0	4-16	High	0.37			
	16-60	35-55	<0.2	0.08-0.13	>7.3	4-16	High	0.37			
Ba	0-8	40-60	0.06-0.2	0.13-0.18	7.4-8.4	<2	High	0.37	5	4	4-8
Baltic	8-26	35-60	0.06-0.2	0.11-0.18	7.4-8.4	2-4	High	0.37			
	26-60	30-50	0.06-0.6	0.08-0.17	7.4-8.4	2-4	High	0.37			
BdA, BdB	0-5	20-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Low	0.28	5	6	2-4
Beadle	5-45	35-45	0.06-0.6	0.13-0.16	6.6-8.4	<2	High	0.28			
	45-60	27-45	0.2-0.6	0.13-0.17	7.4-8.4	2-4	Moderate	0.37			
BgB*:											
Beadle	0-5	20-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Low	0.28	5	6	2-4
	5-45	35-45	0.06-0.6	0.13-0.16	6.6-8.4	<2	High	0.28			
	45-60	27-45	0.2-0.6	0.13-0.17	7.4-8.4	2-4	Moderate	0.37			
Jerauld	0-3	15-25	0.6-2.0	0.18-0.22	5.6-7.3	<4	Moderate	0.37	3	6	1-3
	3-9	35-60	<0.2	0.10-0.15	6.6-8.4	2-8	High	0.37			
	9-17	35-60	<0.2	0.10-0.15	7.9-9.0	4-16	High	0.37			
	17-60	27-45	<0.2	0.08-0.13	7.4-9.0	4-16	High	0.37			
Dudley	0-6	18-25	0.6-2.0	0.18-0.22	5.6-7.3	<2	Moderate	0.43	3	6	2-4
	6-21	35-50	<0.2	0.13-0.19	6.1-8.4	4-8	High	0.32			
	21-45	30-50	0.06-0.2	0.13-0.19	7.4-9.0	8-16	Moderate	0.32			
	45-60	20-35	0.06-0.6	0.13-0.19	7.9-9.0	8-16	Moderate	0.32			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
BlB*:											
Beadle	0-5	20-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Low	0.28	5	6	2-4
	5-45	35-45	0.06-0.6	0.13-0.16	6.6-8.4	<2	High	0.28			
	45-60	27-45	0.2-0.6	0.13-0.17	7.4-8.4	2-4	Moderate	0.37			
Lane	0-8	27-40	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.28	5	4	4-6
	8-30	35-50	0.06-0.6	0.13-0.19	6.6-7.8	<2	High	0.28			
	30-60	27-45	0.06-0.6	0.11-0.20	7.4-8.4	<4	High	0.37			
BmD*:											
Betts	0-2	18-27	0.6-2.0	0.16-0.18	6.6-8.4	<2	Moderate	0.20	5	8	2-4
	2-22	20-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	22-60	20-35	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
Ethan	0-4	18-25	0.6-2.0	0.11-0.15	6.1-7.8	<2	Moderate	0.20	5	8	1-3
	4-36	20-30	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	36-60	20-30	0.2-0.6	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
BoE*:											
Betts	0-2	18-27	0.6-2.0	0.16-0.18	6.6-8.4	<2	Moderate	0.28	5	4L	1-3
	2-22	20-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	22-60	20-35	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
Ethan	0-8	20-27	0.6-2.0	0.18-0.20	6.6-8.4	<2	Moderate	0.28	5	4L	1-3
	8-22	18-30	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	22-60	18-30	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Br, Bv	0-40	20-27	0.6-2.0	0.19-0.22	6.6-8.4	<2	Low	0.24	5	6	4-6
Bon	40-52	20-30	0.6-2.0	0.13-0.17	7.4-8.4	<2	Low	0.32			
	52-60	15-30	0.6-6.0	0.11-0.16	7.4-8.4	<2	Low	0.32			
CdB*:											
Canning	0-7	20-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Moderate	0.28	4	6	2-4
	7-33	27-35	0.6-2.0	0.17-0.20	6.6-7.8	<2	Moderate	0.28			
	33-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Delmont	0-8	20-27	0.6-2.0	0.18-0.20	6.1-7.8	<2	Low	0.28	3	6	2-4
	8-15	18-30	0.6-6.0	0.12-0.18	6.1-7.8	<2	Low	0.28			
	15-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Cm	0-8	35-40	0.06-0.2	0.16-0.19	5.6-7.8	<2	High	0.28	5	4	4-6
Clamo	8-60	35-50	0.06-0.2	0.16-0.19	6.1-7.8	2-4	High	0.28			
CpB*, CpC*:											
Clarno	0-7	20-27	0.6-2.0	0.18-0.20	6.1-7.3	<2	Low	0.28	5	6	2-4
	7-14	20-30	0.6-2.0	0.16-0.20	6.6-7.8	<2	Moderate	0.37			
	14-39	20-30	0.6-2.0	0.16-0.20	7.4-8.4	<4	Moderate	0.37			
	39-60	20-30	0.2-0.6	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Ethan	0-8	20-27	0.6-2.0	0.18-0.20	6.6-8.4	<2	Moderate	0.28	5	4L	1-3
	8-22	18-30	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	22-60	18-30	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Prosper	0-10	20-26	0.6-2.0	0.18-0.22	5.6-7.8	<2	Moderate	0.28	5	6	4-6
	10-27	27-35	0.6-2.0	0.19-0.22	6.6-7.8	<2	Moderate	0.28			
	27-41	20-30	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.28			
	41-60	20-30	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
CrA*:											
Clarno	0-7	20-27	0.6-2.0	0.18-0.20	6.1-7.3	<2	Low	0.28	5	6	2-4
	7-14	20-30	0.6-2.0	0.16-0.20	6.6-7.8	<2	Moderate	0.37			
	14-39	20-30	0.6-2.0	0.16-0.20	7.4-8.4	<4	Moderate	0.37			
	39-60	20-30	0.2-0.6	0.16-0.20	7.4-9.0	2-8	Moderate	0.37			
Prosper	0-10	20-26	0.6-2.0	0.18-0.22	5.6-7.8	<2	Moderate	0.28	5	6	4-6
	10-27	27-35	0.6-2.0	0.19-0.22	6.6-7.8	<2	Moderate	0.28			
	27-41	20-30	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.28			
	41-60	20-30	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
DaA, DaB	0-9	18-27	0.6-2.0	0.18-0.22	6.1-7.3	<2	Moderate	0.24	5	6	4-6
Davis	9-34	18-30	0.6-2.0	0.18-0.22	6.1-7.8	<2	Moderate	0.24			
	34-60	18-27	0.6-2.0	0.18-0.20	7.4-8.4	<4	Moderate	0.24			
Dc	0-10	18-26	0.6-2.0	0.18-0.20	6.6-8.4	<2	Moderate	0.28	5	4L	2-4
Davison	10-18	18-30	0.6-2.0	0.13-0.17	7.4-9.0	<2	Moderate	0.37			
	18-32	18-30	0.6-2.0	0.16-0.20	7.4-8.4	2-4	Moderate	0.37			
	32-60	15-30	0.2-2.0	0.10-0.18	7.4-8.4	2-8	Moderate	0.37			
DeC	0-8	20-27	0.6-2.0	0.18-0.20	6.1-7.8	<2	Low	0.28	3	6	2-4
Delmont	8-15	18-30	0.6-6.0	0.12-0.18	6.1-7.8	<2	Low	0.28			
	15-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
DgA*:											
Delmont	0-8	20-27	0.6-2.0	0.18-0.20	6.1-7.8	<2	Low	0.28	3	6	2-4
	8-15	18-30	0.6-6.0	0.12-0.18	6.1-7.8	<2	Low	0.28			
	15-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Enet	0-7	20-27	0.6-2.0	0.18-0.20	5.6-7.3	<2	Low	0.28	4	6	2-4
	7-14	18-30	0.6-2.0	0.18-0.22	6.6-7.8	<2	Low	0.28			
	14-25	15-30	0.6-6.0	0.11-0.20	6.6-8.4	<2	Low	0.28			
	25-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
DkD*:											
Delmont	0-8	20-27	0.6-2.0	0.18-0.20	6.1-7.8	<2	Low	0.28	3	6	2-4
	8-15	18-30	0.6-6.0	0.12-0.18	6.1-7.8	<2	Low	0.28			
	15-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Ethan	0-8	20-27	0.6-2.0	0.18-0.20	6.6-8.4	<2	Moderate	0.28	5	4L	1-3
	8-22	18-30	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	22-60	18-30	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
DmD*:											
Delmont	0-8	20-27	0.6-2.0	0.18-0.20	6.1-7.8	<2	Low	0.28	3	6	2-4
	8-15	18-30	0.6-6.0	0.12-0.18	6.1-7.8	<2	Low	0.28			
	15-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Talmo	0-7	18-25	0.6-2.0	0.18-0.20	6.6-7.8	<2	Low	0.20	2	6	2-4
	7-60	0-10	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
DpA*:											
Dudley	0-6	18-25	0.6-2.0	0.18-0.22	5.6-7.3	<2	Moderate	0.43	3	6	2-4
	6-21	35-50	<0.2	0.13-0.19	6.1-8.4	4-8	High	0.32			
	21-45	30-50	0.06-0.2	0.13-0.19	7.4-9.0	8-16	Moderate	0.32			
	45-60	20-35	0.06-0.6	0.13-0.19	7.9-9.0	8-16	Moderate	0.32			
Jerauld	0-3	15-25	0.6-2.0	0.18-0.22	5.6-7.3	<4	Moderate	0.37	3	6	1-3
	3-9	35-60	<0.2	0.10-0.15	6.6-8.4	2-8	High	0.37			
	9-17	35-60	<0.2	0.10-0.15	7.9-9.0	4-16	High	0.37			
	17-60	27-45	<0.2	0.08-0.13	7.4-9.0	4-16	High	0.37			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
Du	0-1	10-26	0.6-2.0	0.17-0.20	6.1-7.3	4-16	Low	0.37	3	6	1-3
Durrstein	1-16	35-60	<0.2	0.10-0.15	6.6-9.0	4-16	High	0.37			
	16-60	35-55	<0.2	0.08-0.13	>7.3	4-16	High	0.37			
Dx*:											
Durrstein	0-1	10-26	0.6-2.0	0.17-0.20	6.1-7.3	4-16	Low	0.37	3	6	1-3
	1-16	35-60	<0.2	0.10-0.15	6.6-9.0	4-16	High	0.37			
	16-60	35-55	<0.2	0.08-0.13	>7.3	4-16	High	0.37			
Egas	0-34	40-50	0.06-0.2	0.10-0.15	7.4-9.0	>8	High	0.28	5	4	2-4
	34-60	35-50	0.06-0.2	0.08-0.13	7.9-9.0	>8	High	0.28			
Dz*:											
Durrstein Variant	0-3	10-26	0.6-2.0	0.17-0.20	6.1-7.3	4-16	Low	0.37	3	6	1-3
	3-16	35-60	<0.2	0.10-0.15	6.6-9.0	4-16	High	0.37			
	16-60	35-55	<0.2	0.08-0.13	>7.3	4-16	High	0.37			
Artesian	0-7	40-50	0.06-0.2	0.10-0.18	6.1-7.8	<2	High	0.37	5	4	3-5
	7-17	45-60	<0.2	0.10-0.14	6.1-7.8	<2	High	0.37			
	17-60	35-50	<0.2	0.10-0.17	7.4-8.4	2-8	High	0.37			
EaB*:											
Eakin	0-7	20-26	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	6	2-4
	7-39	28-35	0.6-2.0	0.18-0.21	6.6-8.4	<2	Moderate	0.43			
	39-60	25-45	0.2-0.6	0.16-0.20	7.4-9.0	<4	Moderate	0.43			
Ethan	0-8	20-27	0.6-2.0	0.18-0.20	6.6-8.4	<2	Moderate	0.28	5	4L	1-3
	8-22	18-30	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	22-60	18-30	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Onita	0-17	20-26	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.28	5	6	4-6
	17-29	35-50	0.2-0.6	0.11-0.17	6.1-7.3	<2	High	0.43			
	29-60	25-35	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
EnA	0-7	20-27	0.6-2.0	0.18-0.20	5.6-7.3	<2	Low	0.28	4	6	2-4
Enet	7-14	18-30	0.6-2.0	0.18-0.22	6.6-7.8	<2	Low	0.28			
	14-25	15-30	0.6-6.0	0.11-0.20	6.6-8.4	<2	Low	0.28			
	25-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
EpB*:											
Enet	0-7	20-27	0.6-2.0	0.18-0.20	5.6-7.3	<2	Low	0.28	4	6	2-4
	7-14	18-30	0.6-2.0	0.18-0.22	6.6-7.8	<2	Low	0.28			
	14-25	15-30	0.6-6.0	0.11-0.20	6.6-8.4	<2	Low	0.28			
	25-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Delmont	0-8	20-27	0.6-2.0	0.18-0.20	6.1-7.8	<2	Low	0.28	3	6	2-4
	8-15	18-30	0.6-6.0	0.12-0.18	6.1-7.8	<2	Low	0.28			
	15-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
EtD*:											
Ethan	0-8	20-27	0.6-2.0	0.18-0.20	6.6-8.4	<2	Moderate	0.28	5	4L	1-3
	8-22	18-30	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	22-60	18-30	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Betts	0-2	18-27	0.6-2.0	0.16-0.18	6.6-8.4	<2	Moderate	0.28	5	4L	1-3
	2-22	20-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	22-60	20-35	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
Fa*:											
Farmsworth	0-10	20-27	0.6-2.0	0.18-0.22	5.6-7.3	<2	Low	0.37	3	6	2-4
	10-25	45-60	<0.2	0.10-0.14	6.1-7.8	4-16	High	0.37			
	25-60	40-55	0.06-0.2	0.08-0.12	7.4-9.0	4-16	High	0.37			
Artesian	0-7	40-50	0.06-0.2	0.10-0.18	6.1-7.8	<2	High	0.37	5	4	3-5
	7-17	45-60	<0.2	0.10-0.14	6.1-7.8	<2	High	0.37			
	17-60	35-50	<0.2	0.10-0.17	7.4-8.4	2-8	High	0.37			
Fd*:											
Farmsworth	0-10	20-27	0.6-2.0	0.18-0.22	5.6-7.3	<2	Low	0.37	3	6	2-4
	10-25	45-60	<0.2	0.10-0.14	6.1-7.8	4-16	High	0.37			
	25-60	40-55	0.06-0.2	0.08-0.12	7.4-9.0	4-16	High	0.37			
Lane	0-8	27-40	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.28	5	4	4-6
	8-30	35-50	0.06-0.6	0.13-0.19	6.6-7.8	<2	High	0.28			
	30-60	27-45	0.06-0.6	0.11-0.20	7.4-8.4	<4	High	0.37			
Fe	0-14	15-25	0.6-2.0	0.15-0.17	6.6-9.0	<2	Low	0.20	5	4L	2-4
Fedora	14-25	5-18	2.0-6.0	0.10-0.14	6.6-9.0	<2	Low	0.20			
	25-36	10-18	2.0-6.0	0.09-0.15	>7.3	<2	Low	0.20			
	36-60	0-10	6.0-20	0.03-0.10	>7.3	<2	Low	0.10			
GpD*:											
Gettys	0-4	30-40	0.2-0.6	0.16-0.19	6.6-8.4	<2	High	0.28	5	4L	1-3
	4-28	35-50	0.2-0.6	0.14-0.17	7.4-8.4	<2	High	0.28			
	28-60	30-50	0.2-0.6	0.11-0.17	7.4-8.4	<4	High	0.28			
Peno	0-3	20-27	0.6-2.0	0.18-0.20	6.6-7.3	<2	Moderate	0.28	5	6	2-4
	3-10	35-45	0.2-0.6	0.13-0.19	6.6-7.8	<2	High	0.28			
	10-60	35-45	0.2-0.6	0.11-0.17	7.4-9.0	2-8	High	0.28			
HaB*, HaC*:											
Hand	0-9	20-27	0.6-2.0	0.18-0.20	5.6-7.8	<2	Moderate	0.28	5	6	2-4
	9-15	20-27	0.6-2.0	0.18-0.20	6.1-7.8	<2	Moderate	0.28			
	15-31	18-30	0.6-2.0	0.18-0.22	7.4-8.4	<4	Moderate	0.28			
	31-60	18-30	0.6-2.0	0.12-0.18	7.4-8.4	2-8	Low	0.28			
Ethan	0-8	20-27	0.6-2.0	0.18-0.20	6.6-8.4	<2	Moderate	0.28	5	4L	1-3
	8-22	18-30	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	22-60	18-30	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Prosper	0-10	20-26	0.6-2.0	0.18-0.22	5.6-7.8	<2	Moderate	0.28	5	6	4-6
	10-27	27-35	0.6-2.0	0.19-0.22	6.6-7.8	<2	Moderate	0.28			
	27-41	20-30	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.28			
	41-60	20-30	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
HcA*:											
Hand	0-9	20-27	0.6-2.0	0.18-0.20	5.6-7.8	<2	Moderate	0.28	5	6	2-4
	9-15	20-27	0.6-2.0	0.18-0.20	6.1-7.8	<2	Moderate	0.28			
	15-31	18-30	0.6-2.0	0.18-0.22	7.4-8.4	<4	Moderate	0.28			
	31-60	18-30	0.6-2.0	0.12-0.18	7.4-8.4	2-8	Low	0.28			
Prosper	0-10	20-26	0.6-2.0	0.18-0.22	5.6-7.8	<2	Moderate	0.28	5	6	4-6
	10-27	27-35	0.6-2.0	0.19-0.22	6.6-7.8	<2	Moderate	0.28			
	27-41	20-30	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.28			
	41-60	20-30	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
HeB	0-12	15-26	2.0-6.0	0.18-0.20	5.6-7.3	<2	Low	0.20	5	5	2-4
Henkin	12-36	7-18	2.0-6.0	0.09-0.18	5.6-8.4	<2	Low	0.20			
	36-60	3-27	0.6-6.0	0.08-0.16	6.1-8.4	<2	Low	0.20			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
HfD----------	0-10	7-15	2.0-6.0	0.11-0.15	6.1-7.3	<2	Low-------	0.20	3	3	1-2
Henkin Variant	10-60	2-10	6.0-20	0.08-0.10	6.1-7.3	<2	Low-------	0.15			
HhA*:											
Highmore--------	0-7	20-26	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	6	2-4
	7-50	25-35	0.6-2.0	0.18-0.21	6.6-8.4	<2	Moderate	0.43			
	50-60	20-34	0.6-2.0	0.17-0.20	7.4-8.4	<2	Low-------	0.43			
Onita----------	0-17	20-26	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.28	5	6	4-6
	17-29	35-50	0.2-0.6	0.11-0.17	6.1-7.3	<2	High------	0.43			
	29-60	25-35	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
HlA*:											
Homme----------	0-8	27-35	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	7	2-4
	8-25	33-40	0.2-0.6	0.11-0.18	6.1-7.8	<2	High------	0.32			
	25-45	20-30	0.2-0.6	0.11-0.18	6.1-7.8	<2	High------	0.32			
	45-60	20-30	0.2-0.6	0.16-0.20	7.4-8.4	2-8	Moderate	0.32			
Onita----------	0-17	20-26	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.28	5	6	4-6
	17-29	35-50	0.2-0.6	0.11-0.17	6.1-7.3	<2	High------	0.43			
	29-60	25-35	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
Beadle----------	0-5	20-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Low-------	0.28	5	6	2-4
	5-45	35-45	0.06-0.6	0.13-0.16	6.6-8.4	<2	High------	0.28			
	45-60	27-45	0.2-0.6	0.13-0.17	7.4-8.4	2-4	Moderate	0.37			
HpB*, HpC*:											
Homme----------	0-8	27-35	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.32	5	7	2-4
	8-25	33-40	0.2-0.6	0.11-0.18	6.1-7.8	<2	High------	0.32			
	25-45	20-30	0.2-0.6	0.11-0.18	6.1-7.8	<2	High------	0.32			
	45-60	20-30	0.2-0.6	0.16-0.20	7.4-8.4	2-8	Moderate	0.32			
Peno----------	0-3	20-27	0.6-2.0	0.18-0.20	6.6-7.3	<2	Moderate	0.28	5	6	2-4
	3-10	35-45	0.2-0.6	0.13-0.19	6.6-7.8	<2	High------	0.28			
	10-60	35-45	0.2-0.6	0.11-0.17	7.4-9.0	2-8	High------	0.28			
HrA*:											
Houdek----------	0-5	15-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Moderate	0.28	5	6	2-4
	5-14	27-35	0.6-2.0	0.16-0.22	6.6-7.8	<2	Moderate	0.37			
	14-25	25-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	25-60	20-30	0.2-0.6	0.17-0.20	7.4-8.4	<8	Moderate	0.37			
Dudley----------	0-6	18-25	0.6-2.0	0.18-0.22	5.6-7.3	<2	Moderate	0.43	3	6	2-4
	6-21	35-50	<0.2	0.13-0.19	6.1-8.4	4-8	High------	0.32			
	21-28	30-50	0.06-0.2	0.13-0.19	7.4-9.0	8-16	Moderate	0.32			
	28-60	20-35	0.06-0.6	0.13-0.19	7.9-9.0	8-16	Moderate	0.32			
HtB*:											
Houdek----------	0-5	15-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Moderate	0.28	5	6	2-4
	5-14	27-35	0.6-2.0	0.16-0.22	6.6-7.8	<2	Moderate	0.37			
	14-25	25-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	25-60	20-30	0.2-0.6	0.17-0.20	7.4-8.4	<8	Moderate	0.37			
Dudley----------	0-6	18-25	0.6-2.0	0.18-0.22	5.6-7.3	<2	Moderate	0.43	3	6	2-4
	6-21	35-50	<0.2	0.13-0.19	6.1-8.4	4-8	High------	0.32			
	21-28	30-50	0.06-0.2	0.13-0.19	7.4-9.0	8-16	Moderate	0.32			
	28-60	20-35	0.06-0.6	0.13-0.19	7.9-9.0	8-16	Moderate	0.32			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
HtB*:											
Jerauld	0-3	15-25	0.6-2.0	0.18-0.22	5.6-7.3	<4	Moderate	0.37	3	6	1-3
	3-9	35-60	<0.2	0.10-0.15	6.6-8.4	2-8	High	0.37			
	9-17	35-60	<0.2	0.10-0.15	7.9-9.0	4-16	High	0.37			
	17-60	27-45	<0.2	0.08-0.13	7.4-9.0	4-16	High	0.37			
HwB*, HwC*:											
Houdek	0-5	15-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Moderate	0.28	5	6	2-4
	5-14	27-35	0.6-2.0	0.16-0.22	6.6-7.8	<2	Moderate	0.37			
	14-25	25-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	25-60	20-30	0.2-0.6	0.17-0.20	7.4-8.4	<8	Moderate	0.37			
Ethan	0-8	20-27	0.6-2.0	0.18-0.20	6.6-8.4	<2	Moderate	0.28	5	4L	1-3
	8-22	18-30	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
	22-60	18-30	0.2-2.0	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
Prosper	0-10	20-26	0.6-2.0	0.18-0.22	5.6-7.8	<2	Moderate	0.28	5	6	4-6
	10-27	27-35	0.6-2.0	0.19-0.22	6.6-7.8	<2	Moderate	0.28			
	27-41	20-30	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.28			
	41-60	20-30	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
HyA*:											
Houdek	0-5	15-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Moderate	0.28	5	6	2-4
	5-14	27-35	0.6-2.0	0.16-0.22	6.6-7.8	<2	Moderate	0.37			
	14-25	25-35	0.6-2.0	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
	25-60	20-30	0.2-0.6	0.17-0.20	7.4-8.4	<8	Moderate	0.37			
Prosper	0-10	20-26	0.6-2.0	0.18-0.22	5.6-7.8	<2	Moderate	0.28	5	6	4-6
	10-27	27-35	0.6-2.0	0.19-0.22	6.6-7.8	<2	Moderate	0.28			
	27-41	20-30	0.6-2.0	0.17-0.20	7.4-8.4	2-4	Moderate	0.28			
	41-60	20-30	0.2-0.6	0.17-0.20	7.4-8.4	2-8	Moderate	0.37			
Ln	0-8	27-40	0.6-2.0	0.19-0.22	6.1-7.3	<2	Moderate	0.28	5	4	4-6
Lane	8-30	35-50	0.06-0.6	0.13-0.19	6.6-7.8	<2	High	0.28			
	30-60	27-45	0.06-0.6	0.11-0.20	7.4-8.4	<4	High	0.37			
Lw	0-7	15-25	0.6-2.0	0.20-0.24	7.4-8.4	<2	Low	0.28	5	4L	3-6
Lawet	7-60	22-35	0.2-2.0	0.14-0.19	7.4-9.0	<2	Moderate	0.28			
On	0-17	20-26	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.28	5	6	4-6
Onita	17-29	35-50	0.2-0.6	0.11-0.17	6.1-7.3	<2	High	0.43			
	29-60	25-35	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
Op*:											
Onita	0-17	20-26	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.28	5	6	4-6
	17-29	35-50	0.2-0.6	0.11-0.17	6.1-7.3	<2	High	0.43			
	29-60	25-35	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.43			
Plankinton	0-9	15-27	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.28	3	6	3-6
	9-39	38-60	<0.2	0.10-0.22	6.1-8.4	<2	High	0.28			
	39-60	35-60	0.06-0.6	0.08-0.17	6.6-8.4	2-8	High	0.28			
PgC*:											
Peno	0-3	20-27	0.6-2.0	0.18-0.20	6.6-7.3	<2	Moderate	0.28	5	6	2-4
	3-10	35-45	0.2-0.6	0.13-0.19	6.6-7.8	<2	High	0.28			
	10-60	35-45	0.2-0.6	0.11-0.17	7.4-9.0	2-8	High	0.28			
Gettys	0-4	30-40	0.2-0.6	0.16-0.19	6.6-8.4	<2	High	0.28	5	4L	1-3
	4-28	35-50	0.2-0.6	0.14-0.17	7.4-8.4	<2	High	0.28			
	28-60	30-50	0.2-0.6	0.11-0.17	7.4-8.4	<4	High	0.28			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
Ph*. Pits											
Pk	0-9	15-27	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.28	3	6	3-6
Plankinton	9-39	38-60	<0.2	0.10-0.22	6.1-8.4	<2	High	0.28			
	39-60	35-60	0.06-0.6	0.08-0.17	6.6-8.4	2-8	High	0.28			
Pr*:											
Plankinton	0-9	15-27	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.28	3	6	3-6
	9-39	38-60	<0.2	0.10-0.22	6.1-8.4	<2	High	0.28			
	39-60	35-60	0.06-0.6	0.08-0.17	6.6-8.4	2-8	High	0.28			
Crossplain	0-8	23-27	0.6-2.0	0.18-0.20	6.1-7.3	<2	Moderate	0.24	5	6	3-6
	8-28	35-45	0.06-0.6	0.11-0.17	6.1-7.3	<2	High	0.32			
	28-43	25-35	0.06-0.6	0.16-0.20	6.6-8.4	<4	Moderate	0.32			
	43-60	25-35	0.06-0.6	0.16-0.20	7.4-8.4	2-8	Moderate	0.32			
ReA, ReB	0-5	22-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Moderate	0.28	5	6	2-4
Ree	5-14	27-35	0.6-2.0	0.17-0.22	6.6-8.4	<2	Moderate	0.28			
	14-37	15-35	0.6-2.0	0.09-0.20	7.4-8.4	<2	Moderate	0.28			
	37-53	35-50	0.2-0.6	0.14-0.18	7.4-8.4	<2	High	0.37			
	53-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
RnA*, RnB*:											
Ree	0-5	22-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Moderate	0.28	5	6	2-4
	5-14	27-35	0.6-2.0	0.17-0.22	6.6-8.4	<2	Moderate	0.28			
	14-37	15-35	0.6-2.0	0.09-0.20	7.4-8.4	<2	Moderate	0.28			
	37-53	35-50	0.2-0.6	0.14-0.18	7.4-8.4	<2	High	0.37			
	53-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Canning	0-7	20-26	0.6-2.0	0.18-0.22	6.1-7.3	<2	Moderate	0.28	4	6	2-4
	7-33	27-35	0.6-2.0	0.17-0.20	6.6-7.8	<2	Moderate	0.28			
	33-60	0-5	6.0-20	0.03-0.06	7.4-8.4	<2	Low	0.10			
Te	0-15	20-27	0.6-2.0	0.19-0.22	5.6-7.3	<2	Moderate	0.32	3	6	2-4
Tetonka	15-35	35-60	<0.2	0.13-0.19	6.1-7.8	<2	High	0.32			
	35-60	30-50	0.06-0.6	0.11-0.17	6.6-8.4	2-8	High	0.32			
Wo	0-13	35-40	0.2-0.6	0.19-0.22	5.6-7.3	<2	Moderate	0.37	5	4	3-5
Worthing	13-40	40-60	0.06-0.2	0.13-0.18	6.1-7.3	<2	High	0.37			
	40-60	30-50	0.2-0.6	0.11-0.17	6.6-8.4	2-8	High	0.37			
Wp	0-13	30-40	0.2-0.6	0.19-0.22	5.6-7.3	<2	High	0.37	5	8	---
Worthing	13-40	40-60	0.06-0.2	0.13-0.18	6.1-7.8	<2	High	0.37			
	40-60	30-50	0.2-0.6	0.11-0.17	6.6-8.4	2-8	High	0.37			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
Ad Alwilda	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
Af Arlo	B	Occasional	Brief	Mar-Oct	0-2.0	Apparent	Oct-Jul	High	High	Moderate.
Ar Artesian	D	Rare	---	---	3.0-6.0	Apparent	Oct-Jul	Low	High	Moderate.
At*:										
Artesian	D	None	---	---	3.0-6.0	Apparent	Oct-Jul	Low	High	Moderate.
Bullcreek	D	None	---	---	4.0-6.0	---	---	Low	High	High.
Av*:										
Artesian	D	None	---	---	3.0-6.0	Apparent	Oct-Jul	Low	High	Moderate.
Durrstein Variant	D	Rare	---	---	3.0-6.0	Apparent	Oct-Jun	Moderate	High	High.
Ba Baltic	D	Occasional	Very brief to brief.	Mar-Sep	0-2.0	Apparent	Jan-Dec	High	High	Moderate.
BdA, BdB Beadle	C	None	---	---	>6.0	---	---	Low	High	Moderate.
BgB*:										
Beadle	C	None	---	---	>6.0	---	---	Low	High	Moderate.
Jerauld	D	None	---	---	>6.0	---	---	Low	High	Moderate.
Dudley	D	None	---	---	>6.0	---	---	Moderate	High	High.
BlB*:										
Beadle	C	None	---	---	>6.0	---	---	Low	High	Moderate.
Lane	C	None	---	---	>6.0	---	---	Low	High	Moderate.
BmD*:										
Betts	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
Ethan	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
BoE*:										
Betts	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Br Bon	B	Rare	---	---	>6.0	---	---	Moderate	Moderate	Low.
Bv Bon	B	Frequent	Brief	Apr-Oct	2.0-6.0	Apparent	Oct-Jul	High	Moderate	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
CdB*:										
Canning	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
Delmont	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
Cm Clamo	C/D	Occasional	Long	Mar-Jun	0.5-3.0	Apparent	Oct-Jun	High	High	High.
CpB*, CpC*:										
Clarno	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Prosper	B	None	---	---	3.0-6.0	Perched	Oct-Jun	High	High	Moderate.
CrA*:										
Clarno	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
Prosper	B	None	---	---	3.0-6.0	Perched	Oct-Jun	High	High	Moderate.
DaA, DaB Davis	B	None	---	---	>6.0	---	---	Moderate	Moderate	Low.
Dc Davison	B	None	---	---	2.0-4.0	Perched	Oct-Jun	High	High	Moderate.
DeC Delmont	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
DgA*:										
Delmont	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
Enet	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
DkD*:										
Delmont	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
DmD*:										
Delmont	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
Talmo	A	None	---	---	>6.0	---	---	Low	Moderate	Low.
DpA*:										
Dudley	D	None	---	---	>6.0	---	---	Moderate	High	High.
Jerauld	D	None	---	---	>6.0	---	---	Low	High	Moderate.
Du Durrstein	D	Occasional	Brief	Apr-Oct	0-1.5	Apparent	Oct-Jun	Moderate	High	High.
Dx*:										
Durrstein	D	Occasional	Brief	Apr-Oct	0-1.5	Apparent	Oct-Jun	Moderate	High	High.
Egas	D	Occasional	Brief	Apr-Oct	0-1.0	Apparent	Oct-Jun	High	High	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
Dz*:										
Durrstein Variant	D	Rare	---	---	3.0-6.0	Apparent	Oct-Jun	Moderate	High	High.
Artesian	D	Rare	---	---	3.0-6.0	Apparent	Oct-Jul	Low	High	Moderate.
EaB*:										
Eakin	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Onita	C	Occasional	Brief	Mar-Oct	2.5-6.0	Perched	Apr-Jun	High	High	Low.
EnA--- Enet	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
EpB*:										
Enet	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
Delmont	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
EtD*:										
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Betts	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
Fa*:										
Farmsworth	D	Rare	---	---	3.0-6.0	Apparent	Oct-Jun	Moderate	High	Moderate.
Artesian	D	Rare	---	---	3.0-6.0	Apparent	Oct-Jul	Low	High	Moderate.
Fd*:										
Farmsworth	D	Rare	---	---	3.0-6.0	Apparent	Oct-Jun	Moderate	High	Moderate.
Lane	C	Rare	---	---	>6.0	---	---	Low	High	Moderate.
Fe--- Fedora	B/D	None	---	---	1.0-4.0	Apparent	Oct-Jun	High	High	Low.
GpD*:										
Gettys	C	None	---	---	>6.0	---	---	Low	High	Moderate.
Peno	C	None	---	---	>6.0	---	---	Low	High	Moderate.
HaB*, HaC*:										
Hand	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
Ethan	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Prosper	B	None	---	---	3.0-6.0	Perched	Oct-Jun	High	High	Moderate.
HcA*:										
Hand	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
Prosper	B	None	---	---	3.0-6.0	Perched	Oct-Jun	High	High	Moderate.
HeB--- Henkin	B	None	---	---	>6.0	---	---	Moderate	Moderate	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
HfD---------- Henkin Variant	A	None--------	---	---	>6.0	---	---	Low------	Moderate	Low.
HhA*:										
Highmore----------	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Low.
Onita----------	C	Occasional	Brief-----	Mar-Oct	2.5-6.0	Perched	Apr-Jun	High-----	High-----	Low.
HlA*:										
Homme----------	C	None--------	---	---	>6.0	---	---	Low------	High-----	Low.
Onita----------	C	Occasional	Brief-----	Mar-Oct	2.5-6.0	Perched	Apr-Jun	High-----	High-----	Low.
Beadle----------	C	None--------	---	---	>6.0	---	---	Low------	High-----	Moderate.
HpB*, HpC*:										
Homme----------	C	None--------	---	---	>6.0	---	---	Low------	High-----	Low.
Peno----------	C	None--------	---	---	>6.0	---	---	Low------	High-----	Moderate.
HrA*:										
Houdek----------	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Moderate.
Dudley----------	D	None--------	---	---	>6.0	---	---	Moderate	High-----	High.
HtB*:										
Houdek----------	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Moderate.
Dudley----------	D	None--------	---	---	>6.0	---	---	Moderate	High-----	High.
Jerauld----------	D	None--------	---	---	>6.0	---	---	Low------	High-----	Moderate.
HwB*, HwC*:										
Houdek----------	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Moderate.
Ethan----------	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Prosper----------	B	Occasional	Very brief	Oct-Jun	3.0-6.0	Perched	Oct-Jun	High-----	High-----	Moderate.
HyA*:										
Houdek----------	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Moderate.
Prosper----------	B	Occasional	Very brief	Oct-Jun	3.0-6.0	Perched	Oct-Jun	High-----	High-----	Moderate.
Ln---------- Lane	C	Rare--------	---	---	>6.0	---	---	Low------	High-----	Moderate.
Lw---------- Lawet	B/D	Rare--------	---	---	1.0-2.0	Apparent	May-Nov	High-----	High-----	Moderate.
On---------- Onita	C	Frequent----	Brief-----	Mar-Oct	2.5-6.0	Perched	Apr-Jun	High-----	High-----	Low.
Op*:										
Onita----------	C	Frequent----	Brief-----	Mar-Oct	2.5-6.0	Perched	Apr-Jun	High-----	High-----	Low.
Plankinton-------	D	None--------	---	---	+1-1.0	Perched	Mar-Jul	Moderate	High-----	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
PgC*:										
Peno	C	None	---	---	>6.0	---	---	Low	High	Moderate.
Gettys	C	None	---	---	>6.0	---	---	Low	High	Moderate.
Ph*.										
Pits										
Pk	D	None	---	---	+1-1.0	Perched	Mar-Jul	Moderate	High	Moderate.
Plankinton										
Pr*:										
Plankinton	D	None	---	---	+1-1.0	Perched	Mar-Jul	Moderate	High	Moderate.
Crossplain	C	Frequent	Brief	Mar-Oct	0.5-3.0	Perched	Sep-Jun	High	High	Moderate.
ReA, ReB	B	None	---	---	>6.0	---	---	Moderate	Moderate	Low.
Ree										
RnA*, RnB*:										
Ree	B	None	---	---	>6.0	---	---	Moderate	Moderate	Low.
Canning	B	None	---	---	>6.0	---	---	Low	Moderate	Low.
Te	C/D	None	---	---	+1-1.0	Perched	Jan-Dec	High	High	Moderate.
Tetonka										
Wo	D	None	---	---	+1-1.0	Perched	Jan-Dec	High	High	Moderate.
Worthing										
Wp	D	None	---	---	+3-0.5	Perched	Jan-Dec	High	High	High.
Worthing										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alwilda	Sandy, mixed, mesic Typic Haplustolls
Arlo	Fine-loamy over sandy or sandy-skeletal, mesic Typic Calciaquolls
Artesian	Fine, montmorillonitic, mesic Vertic Haplustolls
Baltic	Fine, montmorillonitic (calcareous), mesic Cumulic Haplaquolls
Beadle	Fine, montmorillonitic, mesic Typic Argiustolls
Betts	Fine-loamy, mixed (calcareous), mesic Typic Ustorthents
Bon	Fine-loamy, mixed, mesic Cumulic Haplustolls
Bullcreek	Very fine, montmorillonitic, mesic Udic Chromusterts
Canning	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Argiustolls
Clamo	Fine, montmorillonitic, mesic Cumulic Haplaquolls
Clarno	Fine-loamy, mixed, mesic Typic Haplustolls
Crossplain	Fine, montmorillonitic, mesic Typic Argiaquolls
Davis	Fine-loamy, mixed, mesic Pachic Haplustolls
Davison	Fine-loamy, mixed, mesic Aquic Calciustolls
Delmont	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplustolls
Dudley	Fine, montmorillonitic, mesic Typic Natrustolls
Durrstein	Fine, montmorillonitic, mesic Typic Natraquolls
Durrstein Variant	Fine, montmorillonitic, mesic Typic Natrustolls
Eakin	Fine-silty, mixed, mesic Typic Argiustolls
Egas	Fine, montmorillonitic (calcareous), mesic Typic Haplaquolls
Enet	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Pachic Haplustolls
Ethan	Fine-loamy, mixed, mesic Typic Calciustolls
Farmsworth	Fine, montmorillonitic, mesic Typic Natrustolls
Fedora	Coarse-loamy, mesic Typic Calciaquolls
Gettys	Fine, montmorillonitic (calcareous), mesic Typic Ustorthents
Hand	Fine-loamy, mixed, mesic Typic Haplustolls
Henkin	Coarse-loamy, mixed, mesic Udic Haplustolls
Henkin Variant	Sandy, mixed, mesic Entic Haplustolls
Highmore	Fine-silty, mixed, mesic Typic Argiustolls
Homme	Fine-silty, mixed, mesic Typic Haplustolls
Houdek	Fine-loamy, mixed, mesic Typic Argiustolls
Jerauld	Fine, montmorillonitic, mesic Leptic Natrustolls
Lane	Fine, montmorillonitic, mesic Pachic Argiustolls
Lawet	Fine-loamy, mesic Typic Calciaquolls
Onita	Fine, montmorillonitic, mesic Pachic Argiustolls
Peno	Fine, montmorillonitic, mesic Typic Argiustolls
Plankinton	Fine, montmorillonitic, mesic Typic Argialbolls
Prosper	Fine-loamy, mixed, mesic Pachic Argiustolls
Ree	Fine-loamy, mixed, mesic Typic Argiustolls
Talmo	Sandy-skeletal, mixed, mesic Udorthentic Haplustolls
Tetonka	Fine, montmorillonitic, mesic Argiaquic Argialbolls
Worthing	Fine, montmorillonitic, mesic Typic Argiaquolls

Interpretive Groups

INTERPRETIVE GROUPS

(Dashes indicate that the soil was not assigned to the interpretive group)

Map symbol and soil name	Land capability	Range site	Windbreak suitability group	Pasture suitability group
Ad Alwilda	IIIe-9	Sandy	6	D1
Af Arlo	Vw-1	Wetland	10	B1
Ar Artesian	IIw-2	Subirrigated	1	A
At:				
Artesian	IIw-2	Subirrigated	1	A
Bullcreek	VIs-5	Dense Clay	10	NS
Av:				
Artesian	IIw-2	Subirrigated	1	A
Durrstein Variant	VIs-1	Thin Claypan	10	NS
Ba Baltic	Vw-1	Wetland	10	B
BdA Beadle	IIs-1	Clayey	4	E
BdB Beadle	IIIe-3	Clayey	4	E
BgB:				
Beadle	IIIe-3	Clayey	4	E
Jerauld	VIs-1	Thin Claypan	10	NS
Dudley	IVs-3	Claypan	9	C
BlB:				
Beadle	IIIe-3	Clayey	4	E
Lane	IIs-1	Clayey	3	E
BmD:				
Betts	VIIs-6	Thin Upland	10	NS
Ethan	VIIs-6	Silty	10	NS
BoE:				
Betts	VIIe-3	Thin Upland	10	G
Ethan	VIIe-3	Silty	10	G
Br Bon	IIc-3	Overflow	1	K
Bv Bon	VIw-1	Overflow	1	K
CdB:				
Canning	IIIe-6	Silty	6	D1
Delmont	IVe-6	Shallow to Gravel	6	D2
Cm Clamo	IIIw-3	Overflow	2	A
CpB:				
Clarno	IIe-2	Silty	3	F
Ethan	IIIe-12	Silty	8	G
Prosper	IIc-3	Overflow	1	K

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Range site	Windbreak suitability group	Pasture suitability group
CpC:				
Clarno	IIIe-2	Silty	3	F
Ethan	IVe-3	Silty	8	G
Prosper	IIc-3	Overflow	1	K
CrA:				
Clarno	IIc-2	Silty	3	F
Prosper	IIc-3	Overflow	1	K
DaA	IIc-3	Silty	3	K
Davis				
DaB	IIe-3	Silty	3	F
Davis				
Dc	IIe-4	Limy Subirrigated	3	F
Davison				
DeC	VIe-5	Shallow to Gravel	6	D2
Delmont				
DgA:				
Delmont	IVs-1	Shallow to Gravel	6	D2
Enet	IIIs-2	Silty	6	D1
DkD:				
Delmont	VIe-5	Shallow to Gravel	10	D2
Ethan	VIe-3	Silty	10	G
DmD:				
Delmont	VIe-5	Shallow to Gravel	10	D2
Talmo	VIs-4	Very Shallow to Gravel.	10	NS
DpA:				
Dudley	IVs-2	Claypan	9	C
Jerauld	VIs-1	Thin Claypan	10	NS
Du	VIw-4	Saline Lowland	10	J
Durrstein				
Dx:				
Durrstein	VIw-4	Saline Lowland	10	J
Egas	VIw-5	Saline Lowland	10	J
Dz:				
Durrstein Variant	VIs-1	Thin Claypan	10	J
Artesian	IIw-2	Subirrigated	1	A
EaB:				
Eakin	IIe-2	Silty	3	F
Ethan	IIIe-12	Silty	8	G
Onita	IIc-3	Overflow	1	K
EnA	IIIs-2	Silty	6	D1
Enet				
EpB:				
Enet	IIIe-6	Silty	6	D1
Delmont	IVe-6	Shallow to Gravel	6	D2
EtD:				
Ethan	VIe-3	Silty	10	G
Betts	VIe-3	Thin Upland	10	G

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Range site	Windbreak suitability group	Pasture suitability group
Fa:				
Farmsworth	IVs-2	Claypan	9	C
Artesian	IIw-2	Subirrigated	1	A
Fd:				
Farmsworth	IVs-2	Claypan	9	C
Lane	IIs-1	Clayey	3	E
Fe	IIIw-5	Subirrigated	2	A
Fedora				
GpD:				
Gettys	VIe-3	Thin Upland	10	G
Peno	VIe-3	Clayey	10	F
HaB:				
Hand	IIe-2	Silty	3	F
Ethan	IIIe-12	Silty	8	G
Prosper	IIc-3	Overflow	1	K
HaC:				
Hand	IIIe-2	Silty	3	F
Ethan	IVe-3	Silty	8	G
Prosper	IIc-3	Overflow	1	K
HcA:				
Hand	IIc-2	Silty	3	F
Prosper	IIc-3	Overflow	1	K
HeB	IIIe-8	Sandy	5	H
Henkin				
HfD	VIe-6	Sandy	10	H
Henkin Variant				
HhA:				
Highmore	IIc-2	Silty	3	F
Onita	IIc-3	Overflow	1	K
HlA:				
Homme	IIc-2	Silty	3	F
Onita	IIc-3	Overflow	1	K
Beadle	IIs-1	Clayey	4	E
HpB:				
Homme	IIe-2	Silty	3	F
Peno	IIIe-12	Clayey	4	F
HpC:				
Homme	IIIe-1	Silty	3	F
Peno	IVe-3	Clayey	4	F
HrA:				
Houdek	IIc-2	Silty	3	F
Dudley	IVs-2	Claypan	9	C
HtB:				
Houdek	IIe-2	Silty	3	F
Dudley	IVs-3	Claypan	9	C
Jerauld	VIs-1	Thin Claypan	10	NS

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Range site	Windbreak suitability group	Pasture suitability group
HwB:				
Houdek	IIe-2	Silty	3	F
Ethan	IIIe-12	Silty	8	G
Prosper	IIc-3	Overflow	1	K
HwC:				
Houdek	IIIe-2	Silty	3	F
Ethan	IVe-3	Silty	8	G
Prosper	IIc-3	Overflow	1	K
HyA:				
Houdek	IIc-2	Silty	3	F
Prosper	IIc-3	Overflow	1	K
Ln Lane	IIs-1	Clayey	3	E
Lw Lawet	IVw-1	Subirrigated	2	A
On Onita	IIc-3	Overflow	1	K
Op:				
Onita	IIc-3	Overflow	1	F
Plankinton	IVw-1	Closed Depression	10	B2
PgC:				
Peno	IVe-3	Clayey	4	F
Gettys	IVe-3	Thin Upland	8	G
Ph Pits, gravel	VIIIs-2		---	---
Pk Plankinton	IVw-1	Closed Depression	10	B2
Pr:				
Plankinton	IVw-1	Closed Depression	10	B2
Crossplain	IIw-1	Overflow	2	A
ReA Ree	IIc-2	Silty	3	F
ReB Ree	IIe-1	Silty	3	F
RnA:				
Ree	IIc-2	Silty	3	F
Canning	IIIs-2	Silty	6	D1
RnB:				
Ree	IIe-1	Silty	3	F
Canning	IIIe-6	Silty	6	D1
Te Tetonka	IVw-1	Wet Meadow	10	B2
Wo Worthing	Vw-4	Shallow Marsh	10	B2
Wp Worthing	VIIIw-1		10	NS

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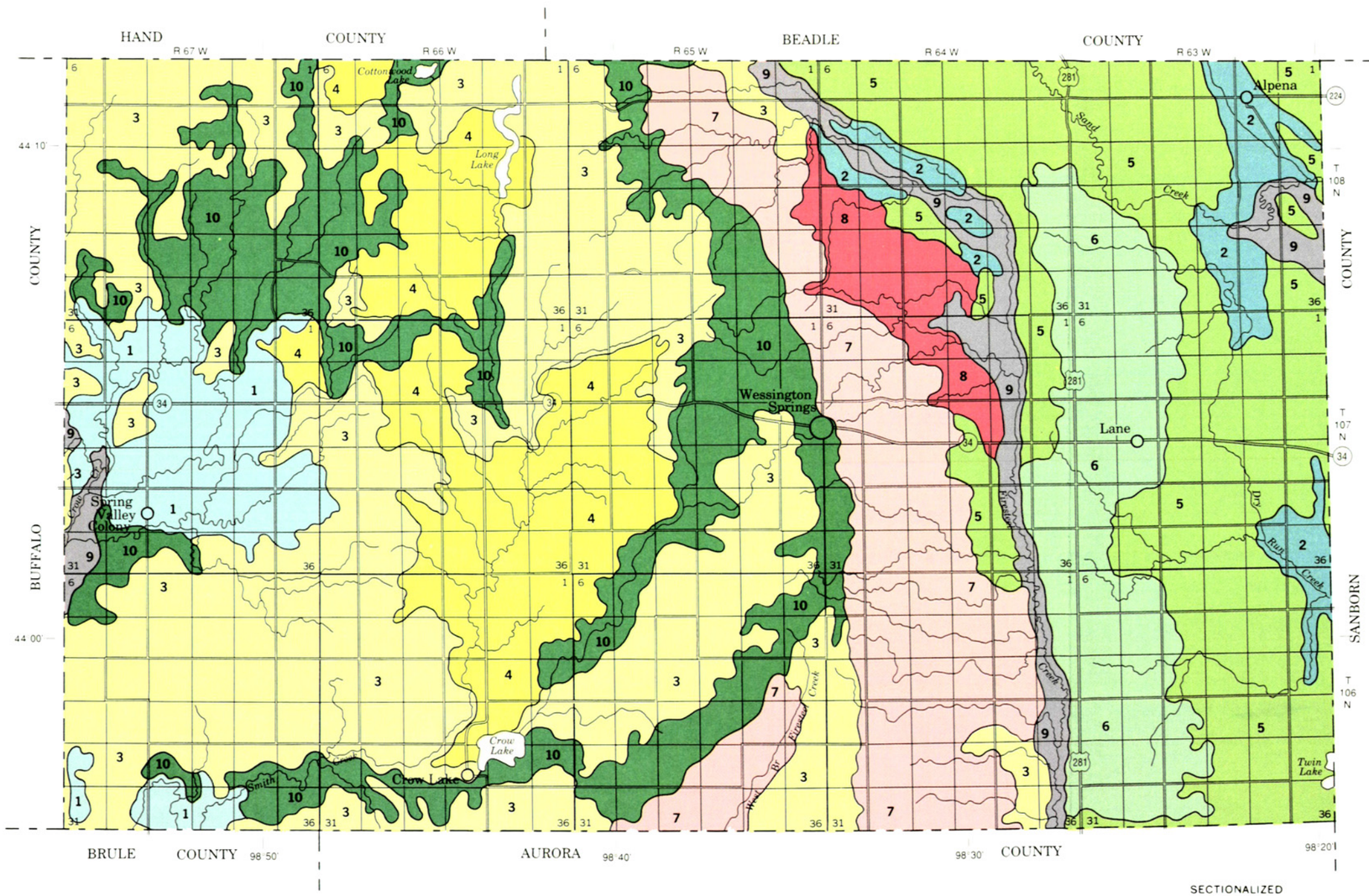


SOIL LEGEND*

NEARLY LEVEL TO MODERATELY STEEP, LOAMY SOILS ON OUTWASH PLAINS AND MORAINES

1 Delmont-Ree-Canning association

2 Enet-Delmont association

NEARLY LEVEL TO MODERATELY STEEP, LOAMY AND SILTY SOILS ON TILL PLAINS AND MORAINES

3 Ethan-Houdek-Eakin association

4 Homme-Peno association

5 Clarno-Ethan-Prosper association

6 Clarno-Prosper association

LEVEL TO GENTLY SLOPING, LOAMY, SILTY, AND CLAYEY SOILS ON TILL PLAINS AND FANS

7 Beadle-Dudley association

8 Artesian-Lane-Durrstein Variant association

LEVEL, SILTY AND CLAYEY SOILS ON FLOOD PLAINS

9 Durrstein-Egas association

MODERATELY SLOPING AND GENTLY ROLLING TO STEEP, LOAMY SOILS ON MORAINES

10 Ethan-Betts association

* The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1993

N

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

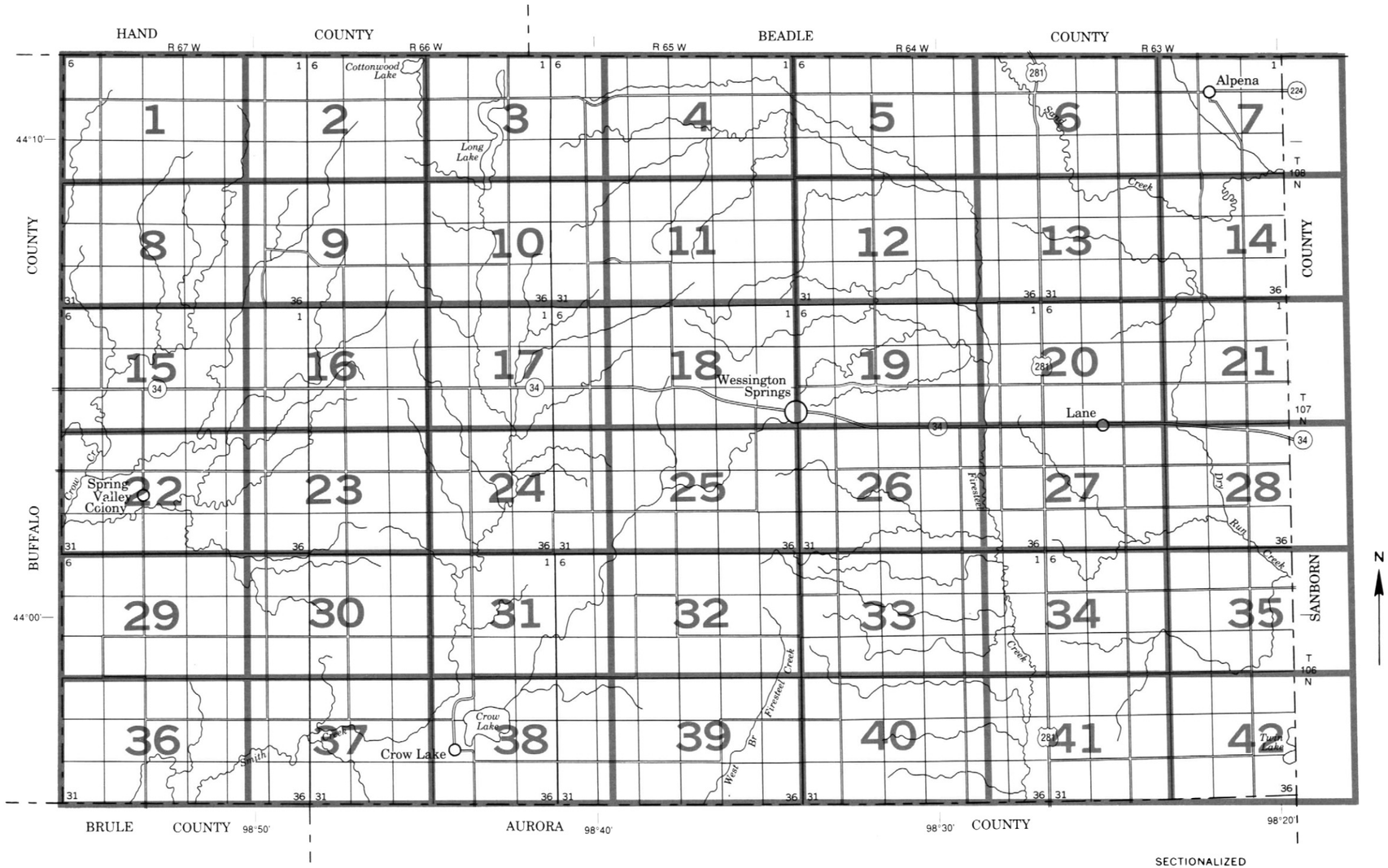
GENERAL SOIL MAP

JERAULD COUNTY, SOUTH DAKOTA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS

JERAULD COUNTY, SOUTH DAKOTA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

SOIL LEGEND

Map symbols consist of a combination of letters. The first capital letter is the initial one of the map unit name. The lowercase letter that follows separates map units having names that begin with the same letter, except that it does not separate sloping phases. The second capital letter indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas.

SYMBOL	NAME
Ad	Alwilda loam
Af	Arlo loam
Ar	Artesian silty clay
At	Artesian-Bullcreek complex
Av	Artesian-Durrstein Variant complex
Ba	Baltic silty clay
BdA	Beadle loam, 0 to 2 percent slopes
BdB	Beadle loam, 2 to 6 percent slopes
BgB	Beadle-Jerauld-Dudley complex, 1 to 5 percent slopes
BlB	Beadle-Lane complex, 1 to 5 percent slopes
BmD	Betts-Ethan loams, 6 to 40 percent slopes, stony
BoE	Betts-Ethan loams, 15 to 40 percent slopes
Br	Bon loam
Bv	Bon loam, channeled
CdB	Canning-Delmont loams, 2 to 6 percent slopes
Cm	Clamo silty clay loam
CpB	Clarno-Ethan-Prosper loams, 1 to 5 percent slopes
CpC	Clarno-Ethan-Prosper loams, 2 to 9 percent slopes
CrA	Clarno-Prosper loams, 0 to 2 percent slopes
DaA	Davis loam, 0 to 2 percent slopes
DaB	Davis loam, 2 to 9 percent slopes
Dc	Davison loam
DeC	Delmont loam, 6 to 9 percent slopes
DgA	Delmont-Enet loams, 0 to 2 percent slopes
DkD	Delmont-Ethan loams, 9 to 20 percent slopes
DmD	Delmont-Talmo loams, 9 to 20 percent slopes
DpA	Dudley-Jerauld complex, 0 to 3 percent slopes
Du	Durrstein silt loam
Dx	Durrstein-Egas complex
Dz	Durrstein Variant-Artesian complex
EaB	Eakin-Ethan-Onita complex, 2 to 6 percent slopes
EnA	Enet loam, 0 to 2 percent slopes
EpB	Enet-Delmont loams, 2 to 6 percent slopes
EtD	Ethan-Betts loams, 9 to 20 percent slopes
Fa	Farmsworth-Artesian complex
Fd	Farmsworth-Lane complex
Fe	Fedora loam
GpD	Gettys-Peno complex, 9 to 20 percent slopes
HaB	Hand-Ethan-Prosper loams, 1 to 5 percent slopes
HaC	Hand-Ethan-Prosper loams, 2 to 9 percent slopes
HcA	Hand-Prosper loams, 0 to 3 percent slopes
HeB	Henkin loam, 1 to 5 percent slopes
HfD	Henkin Variant sandy loam, 6 to 40 percent slopes
HhA	Highmore-Onita silt loams, 0 to 3 percent slopes
HlA	Homme-Onita-Beadle complex, 0 to 2 percent slopes
HpB	Homme-Peno complex, 2 to 6 percent slopes
HpC	Homme-Peno complex, 6 to 9 percent slopes
HrA	Houdek-Dudley complex, 0 to 3 percent slopes
HtB	Houdek-Dudley-Jerauld complex, 2 to 6 percent slopes
HwB	Houdek-Ethan-Prosper loams, 1 to 5 percent slopes
HwC	Houdek-Ethan-Prosper loams, 2 to 9 percent slopes
HyA	Houdek-Prosper loams, 0 to 3 percent slopes
Ln	Lane silty clay loam
Lw	Lawet loam
On	Onita silt loam, 0 to 3 percent slopes
Op	Onita-Plankinton silt loams
PgC	Peno-Gettys complex, 6 to 9 percent slopes
Ph	Pits, gravel
Pk	Plankinton silt loam
Pr	Plankinton-Crossplain complex
ReA	Ree loam, 0 to 2 percent slopes
ReB	Ree loam, 2 to 6 percent slopes
RnA	Ree-Canning loams, 0 to 2 percent slopes
RnB	Ree-Canning loams, 2 to 6 percent slopes
Te	Tetonka silt loam
Wo	Worthing silty clay loam
Wp	Worthing silty clay loam, ponded

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline
- AD HOC BOUNDARY (label)
- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK — 890 000 FEET

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 86
- Federal — 287
- State — 52
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small — water

PITS

- Gravel pit < 2 acres
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water
- Intermittent — int.

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot < 3 avres

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — Ad, HpB

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

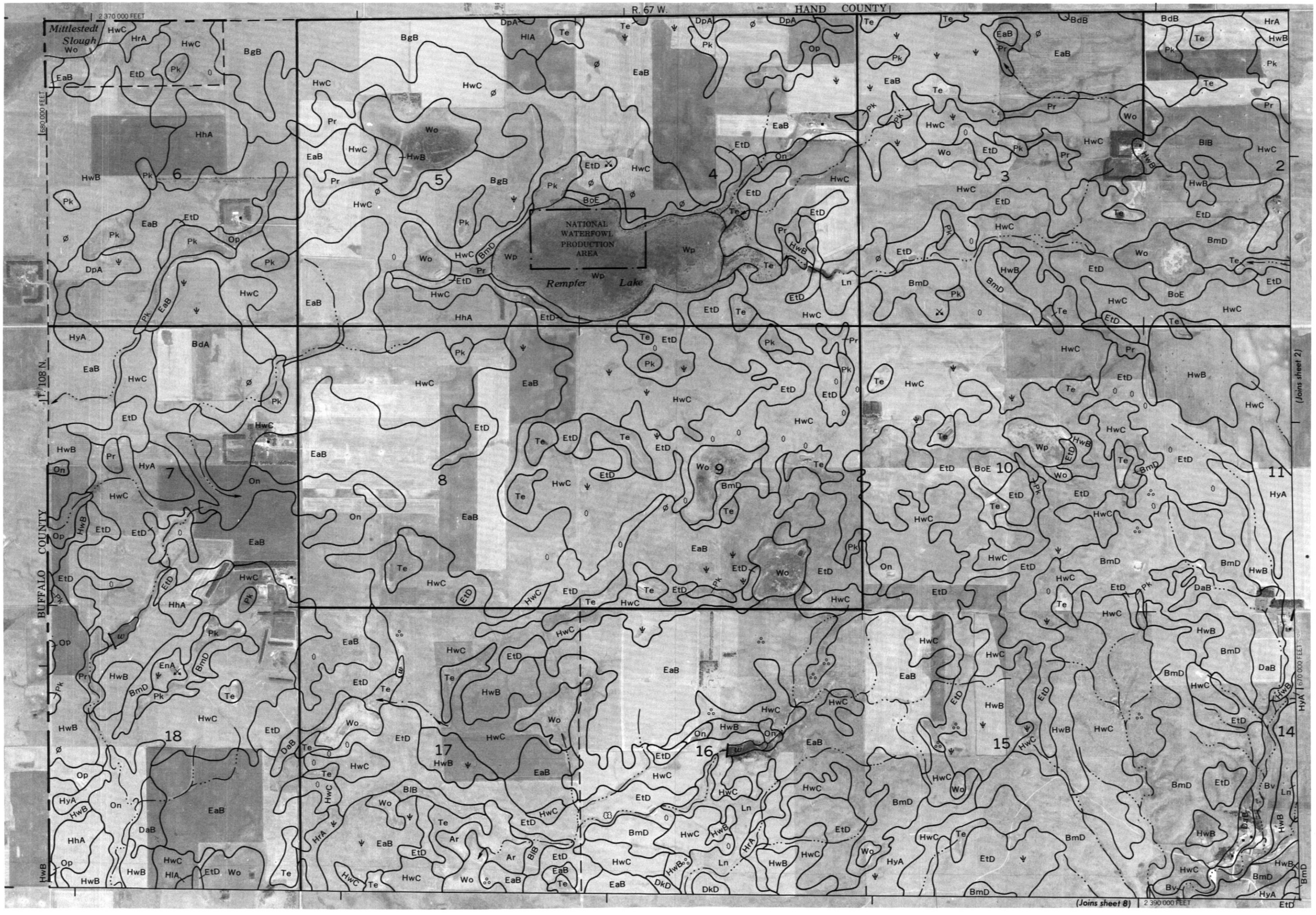
DEPRESSION OR SINK

SOIL SAMPLE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot < 4 acres
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot < 4 acres

JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 1



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JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 2

(2)

N

R. 67 W. | R. 66 W.

HAND COUNTY

2 415 000 FEET

680 000 FEET

T. 108 N.

(Joins sheet 1)

(Joins sheet 3)

(Joins sheet 9)

2 395 000 FEET

670 000 FEET

Cottonwood Lake

NATIONAL WATERFOWL PRODUCTION AREA

1 MILE

1 KILOMETER

SCALE 1:20 000

0 0.5 1

1/4 1/2 3/4 1

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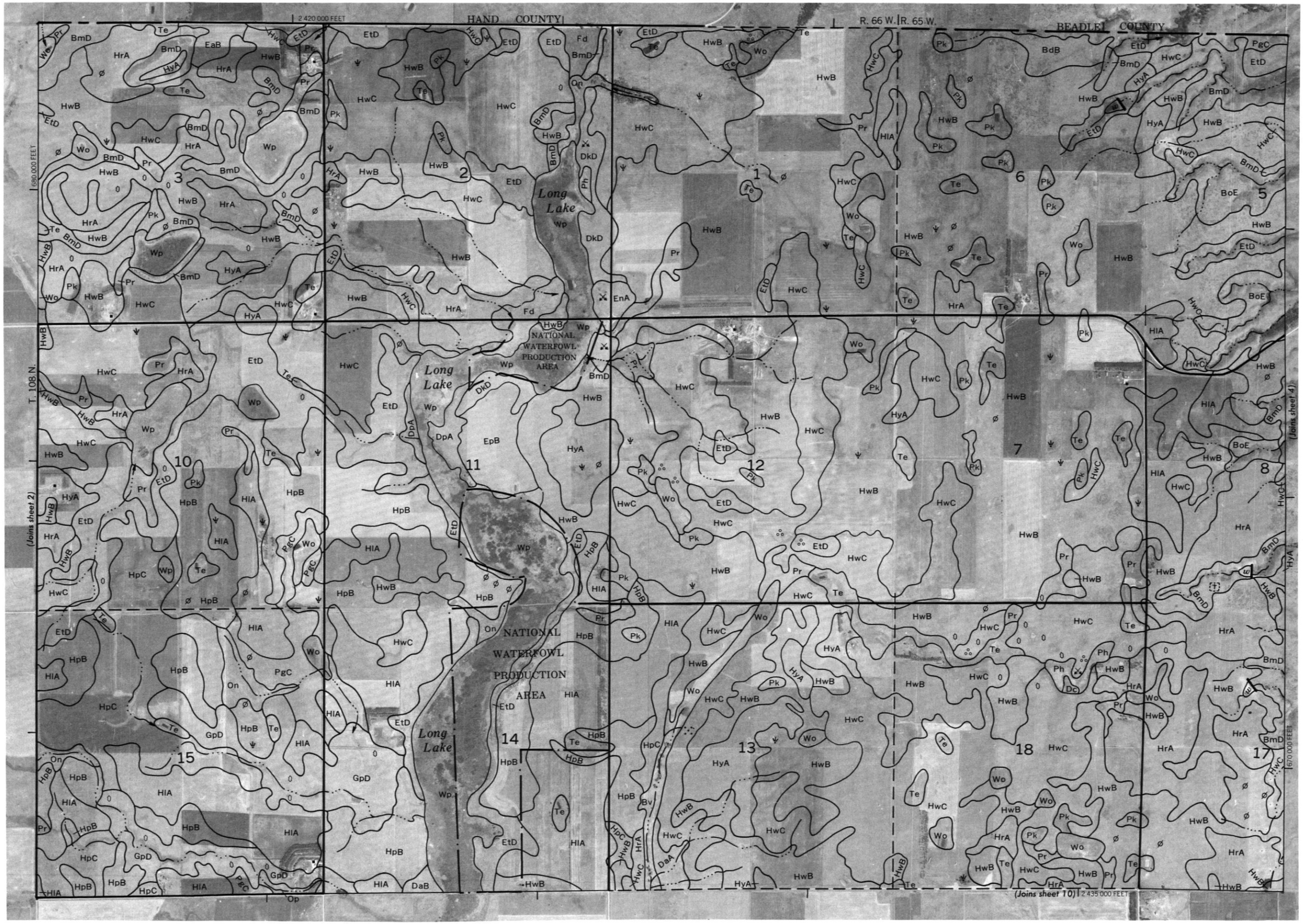

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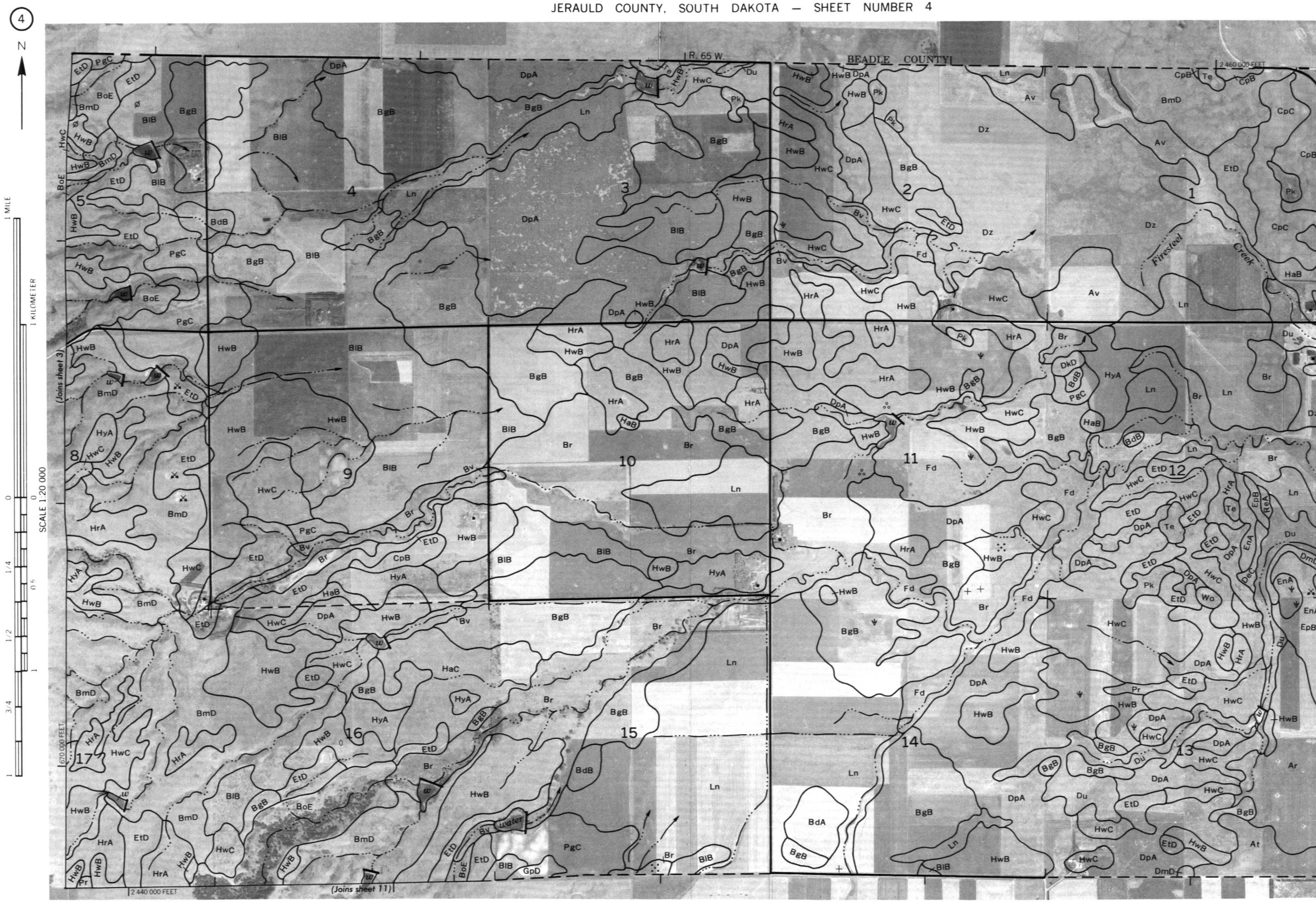

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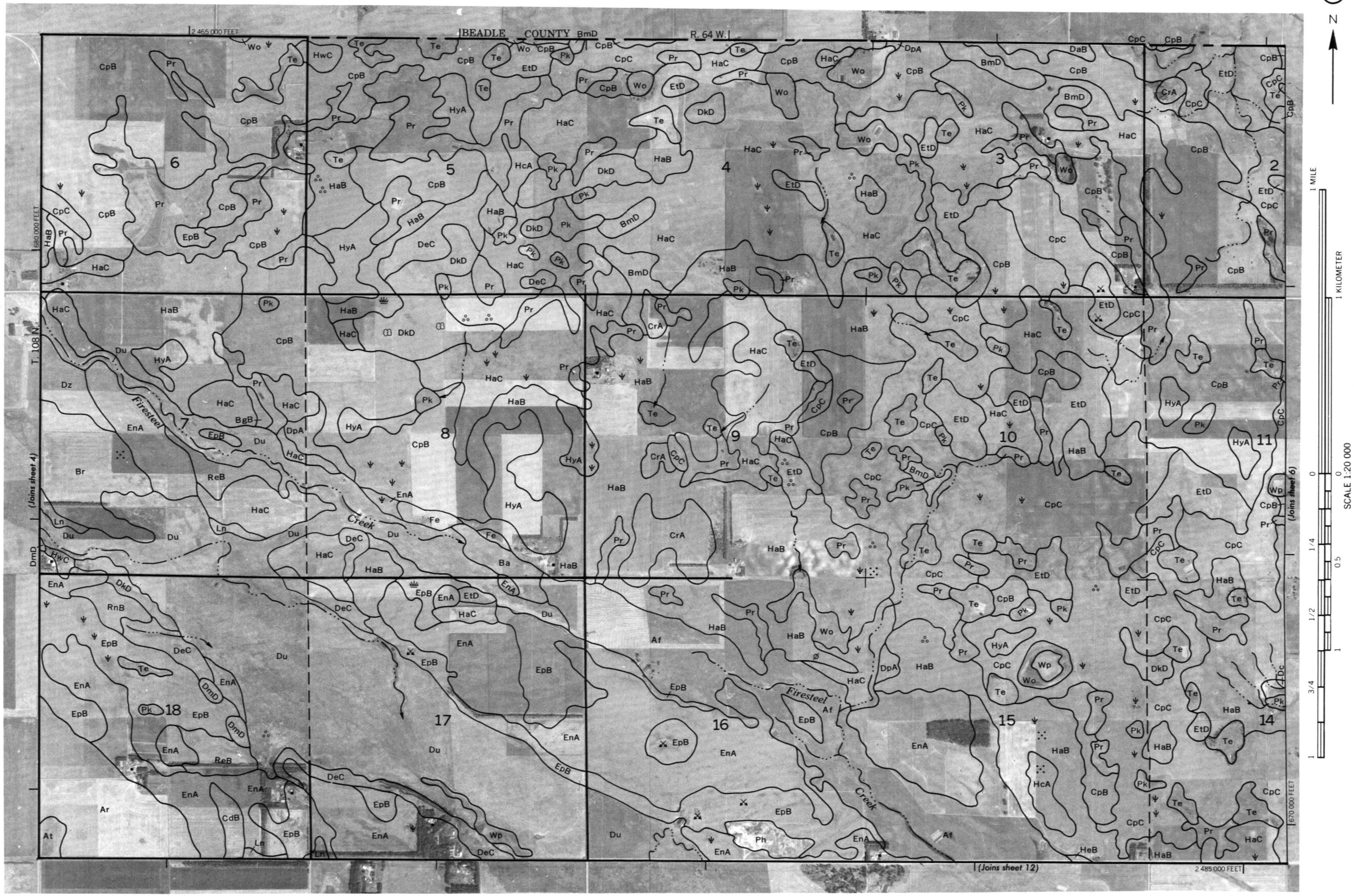

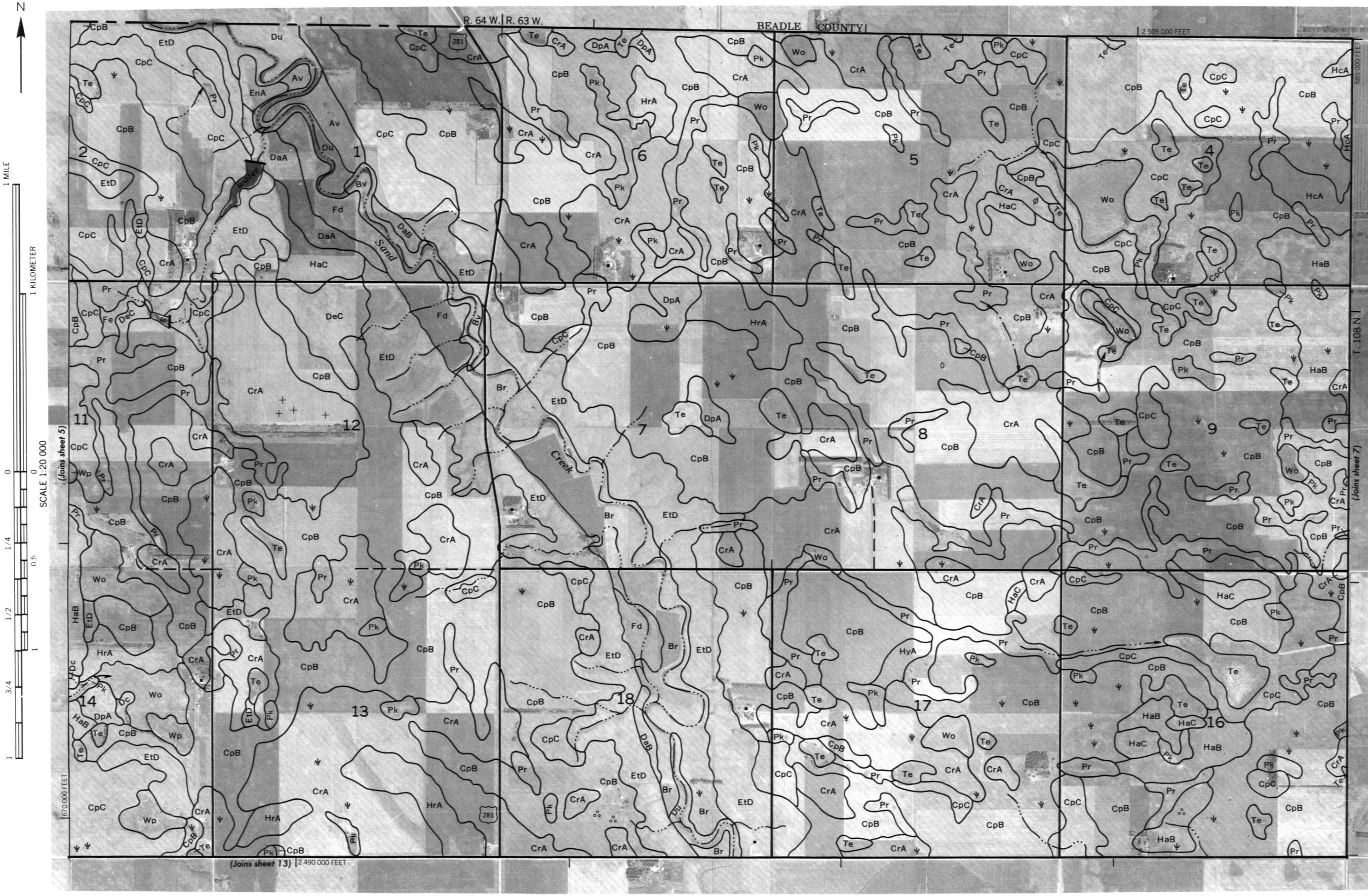

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7

N

1 MILE
1 KILOMETER
SCALE 1:20 000

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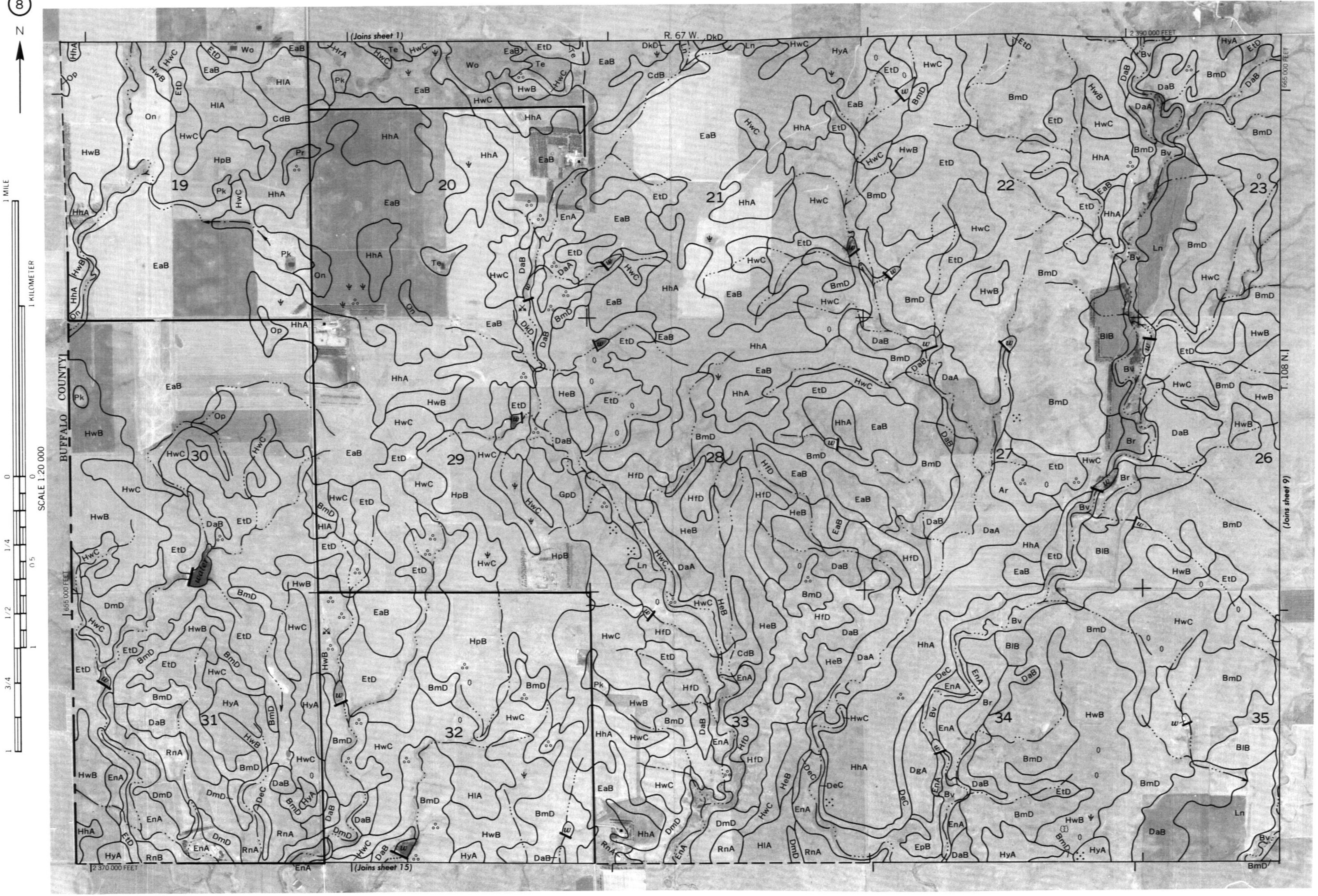
JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 8



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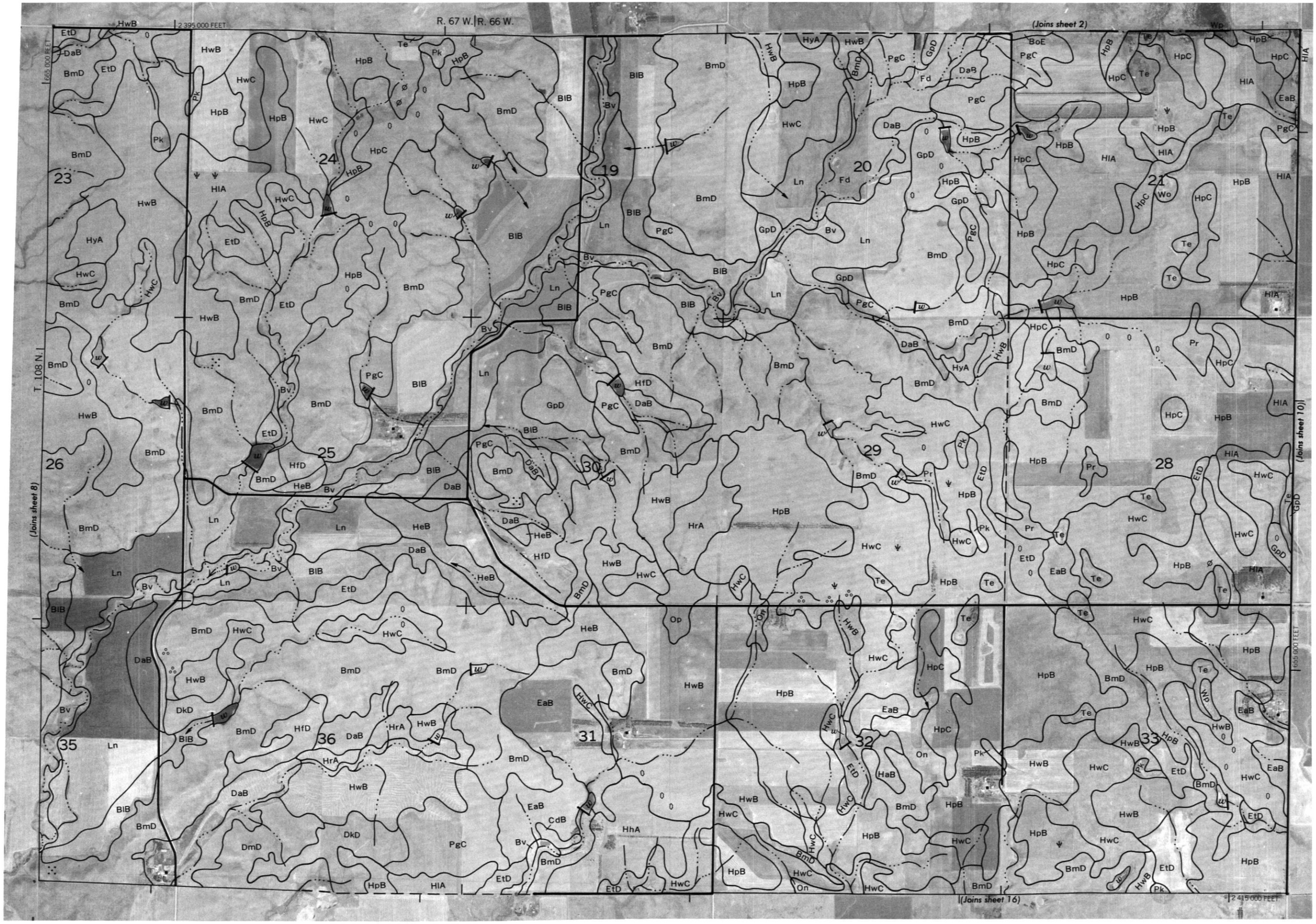
JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 9



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N

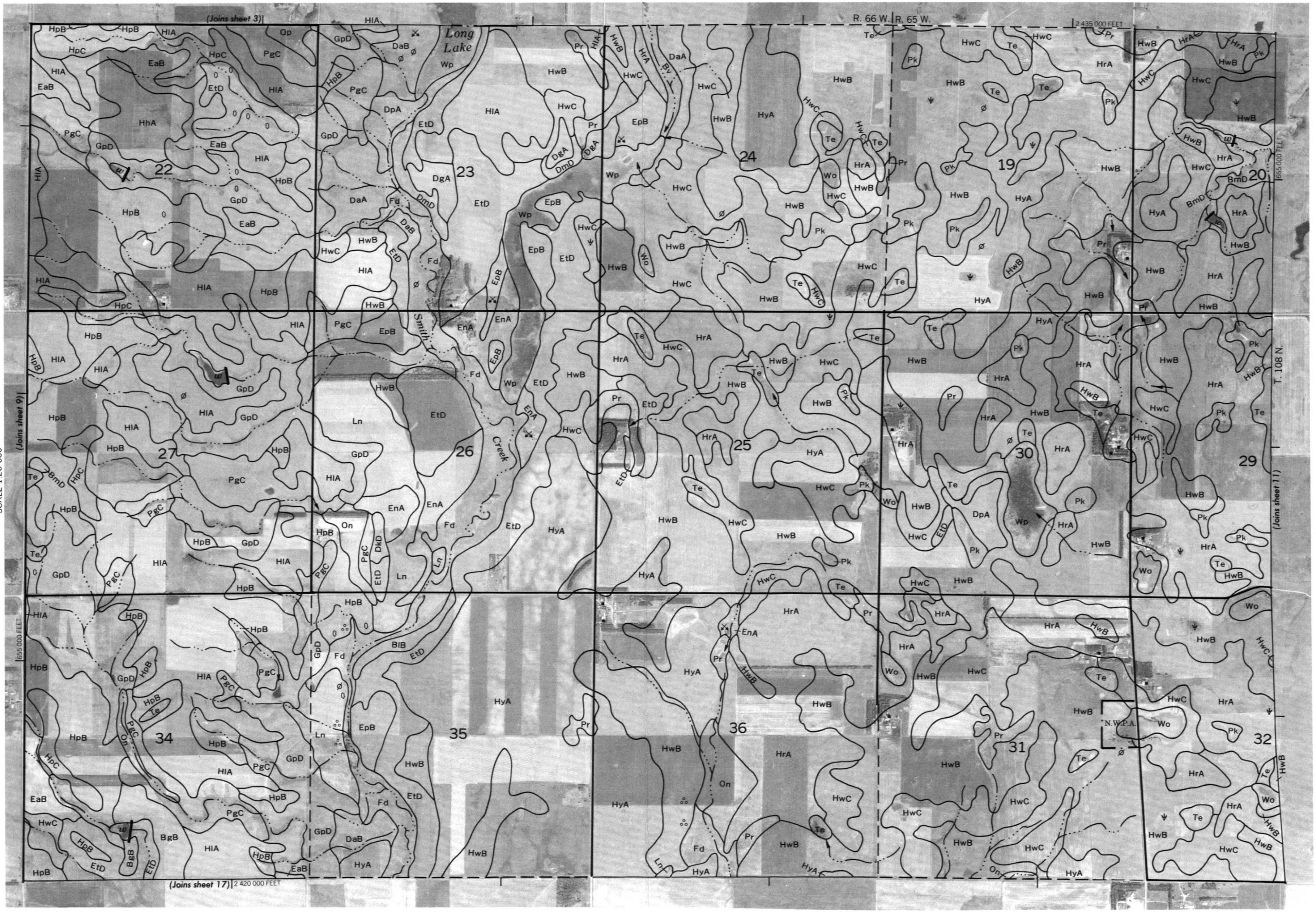
1 MILE

1 KILOMETER

SCALE 1:20 000

0 1/4 1/2 3/4 1

0 0.5 1



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12

N

1 MILE

1 KILOMETER

SCALE 1:20 000

0 0 1/4 0.5 1/2 1 3/4 1

(Joins sheet 5)

R. 64 W.

2 485 000 FEET

665 000 FEET

T. 108 N.

(Joins sheet 11)

(Joins sheet 13)

2 465 000 FEET

(Joins sheet 19)

19 20 21 22 23 30 29 28 27 26 31 32 33 34 35

Firesteel Creek

water

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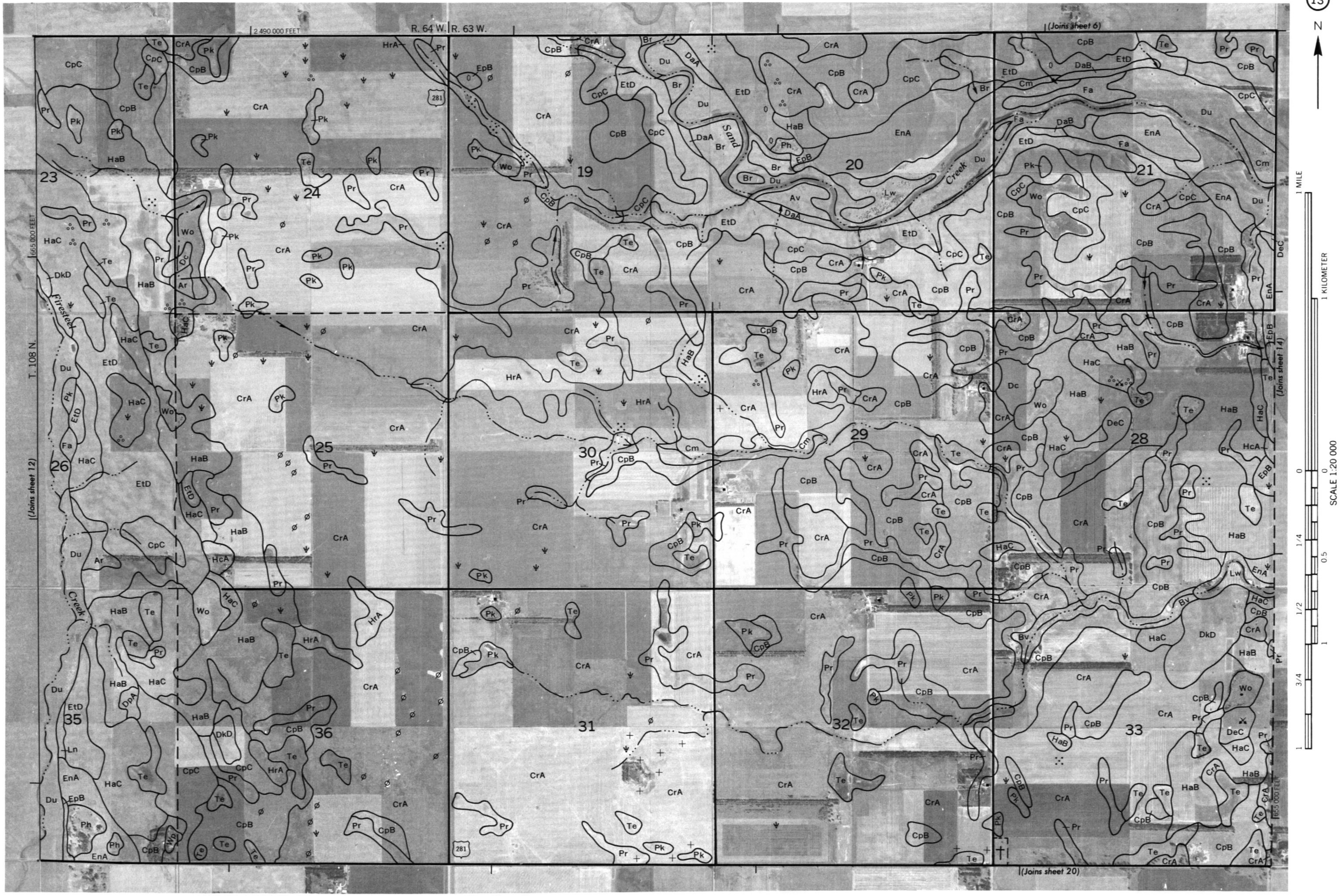

N

R. 63 W.

T. 108 N.

SANBORN COUNTY

(Joins sheet 7)

(Joins sheet 13)

(Joins sheet 21)

2 530 000 FEET

670 000 FEET

650 000 FEET

2 510 000 FEET

1 MILE

1 KILOMETER

SCALE 1:20 000

0 0 1/4 0.5 1/2 1 3/4 1

Sand Creek

Creek

BURLINGTON NORTHERN

NATIONAL WATERFOWL PRODUCTION AREA

22 23 24 25 26 27 34 35 36

CpB CpC CrA CrB DeC DgA DkD DmD DpA Du DxA EnA EpB EtD Fa Fe HaB HaC HcA HeB HtB Pr Te Wo

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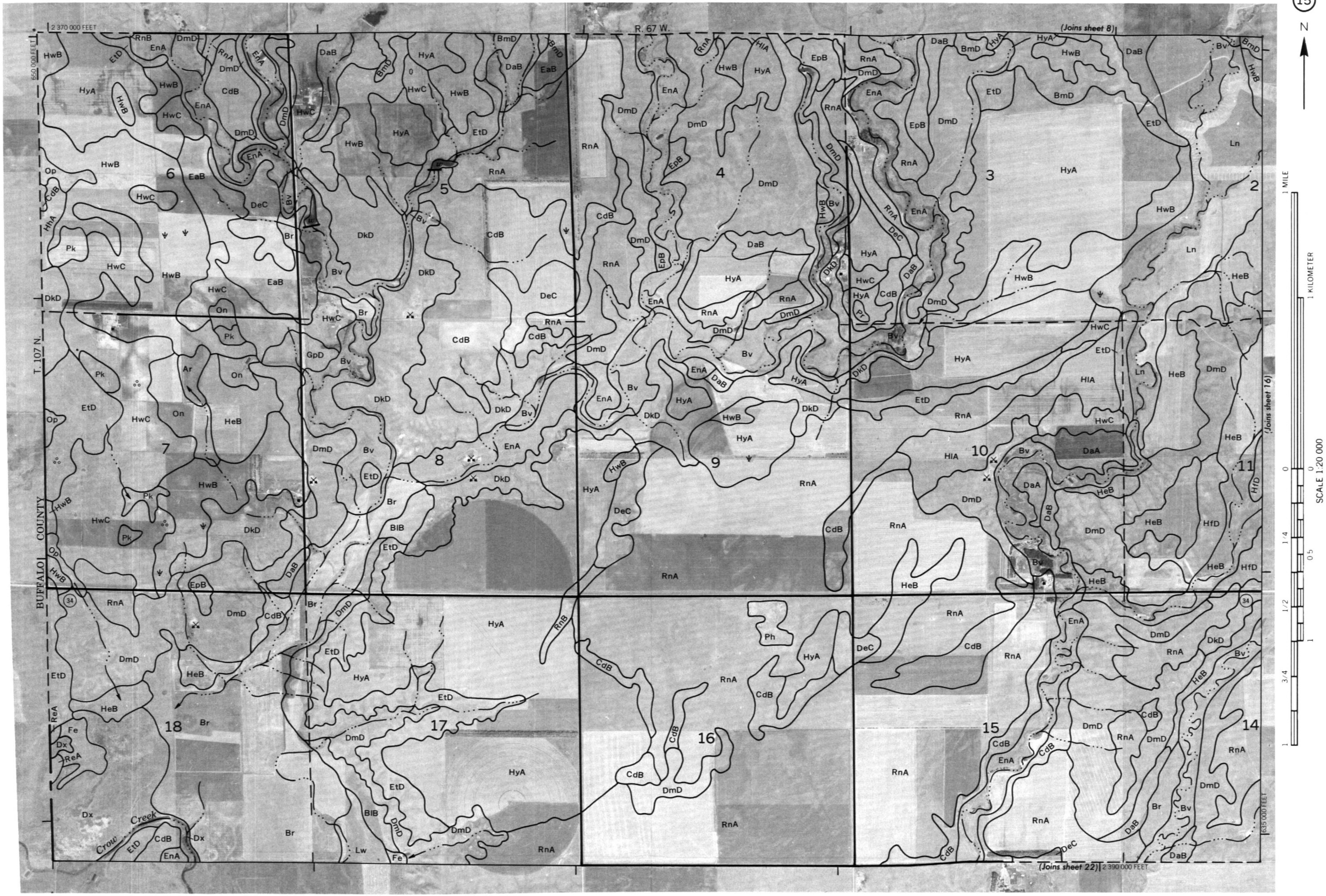

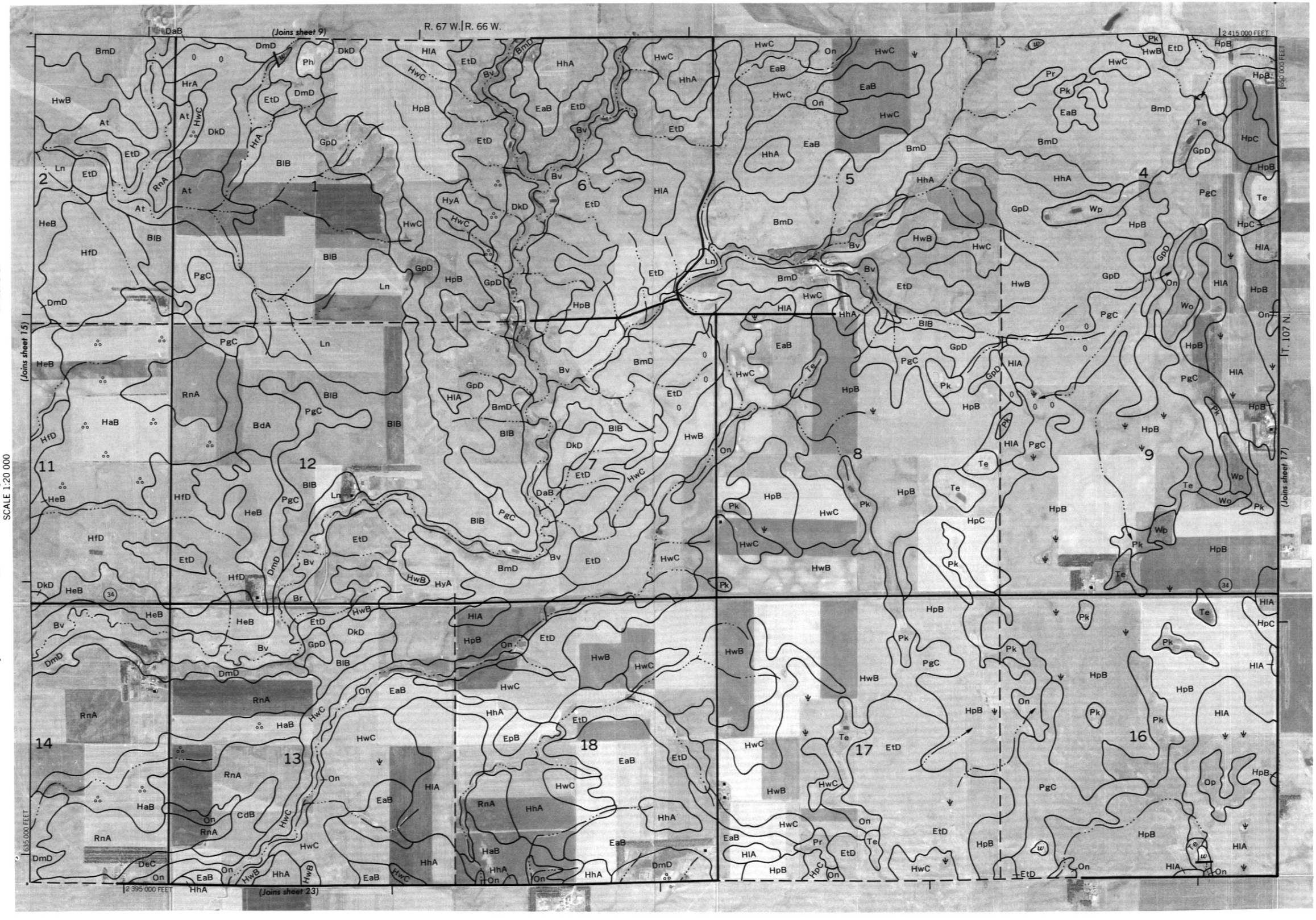

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 17

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N

1 MILE

1 KILOMETER

SCALE 1:20 000

(Joins sheet 11) R. 65 W. 2 460 000 FEET

(Joins sheet 17) 640 000 FEET

(Joins sheet 19) 650 000 FEET

T. 107 N.

(Joins sheet 25) 2 445 000 FEET

Bakers Lake

Wessington Hills

Deans Lake

WESSINGTON SPRINGS (county seat)

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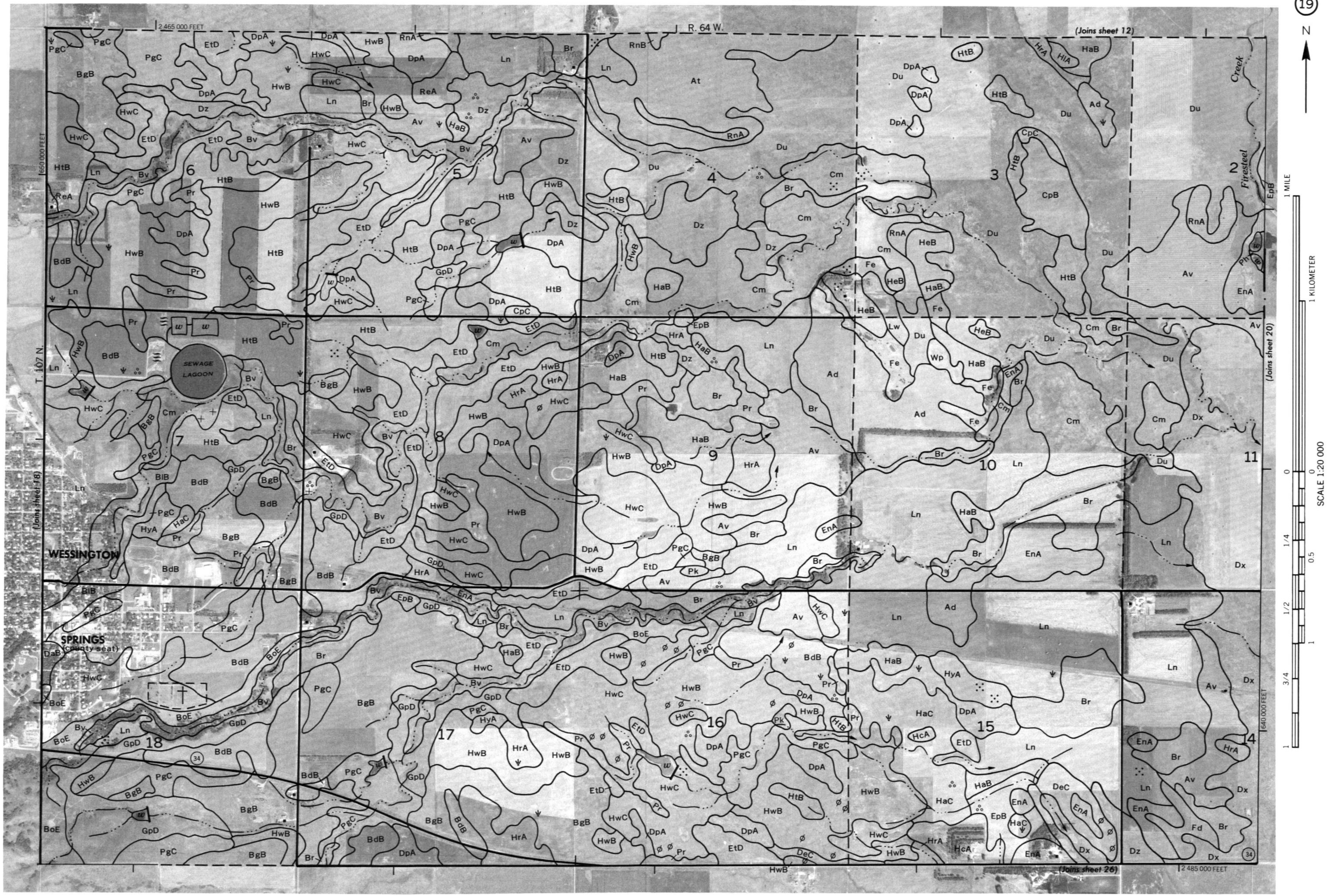

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 20

20

N

1 MILE

1 KILOMETER

SCALE 1:20 000

0 0 1/4 0.5 1/2 1 3/4 1

R. 64 W. R. 63 W.

(Joins sheet 13)

2 505 000 FEET

650 000 FEET

640 000 FEET

2 490 000 FEET

T. 107 N.

(Joins sheet 19)

(Joins sheet 21)

(Joins sheet 27)

NATIONAL WATERFOWL PRODUCTION AREA

Creek

Firesteel

Lane

281

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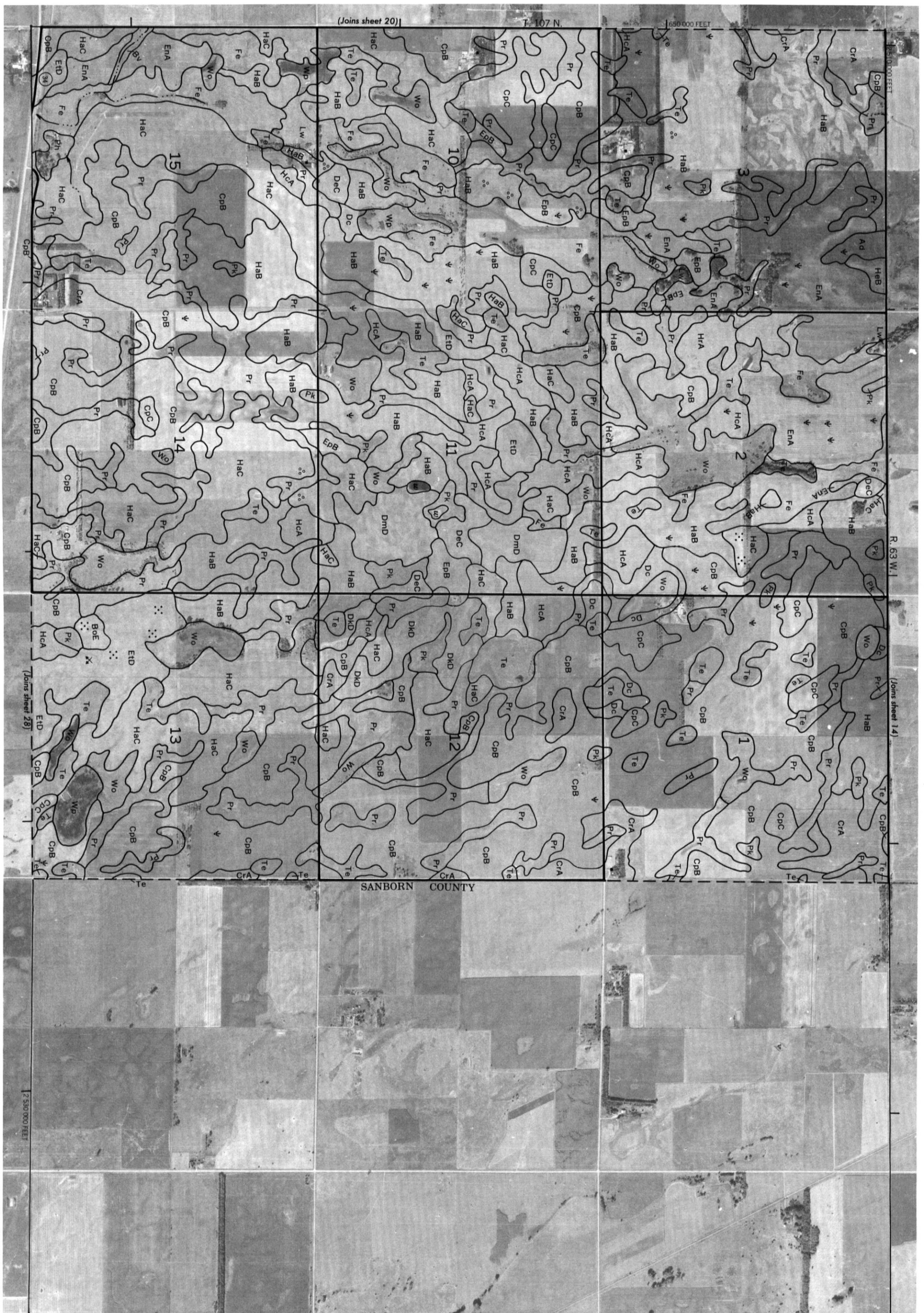
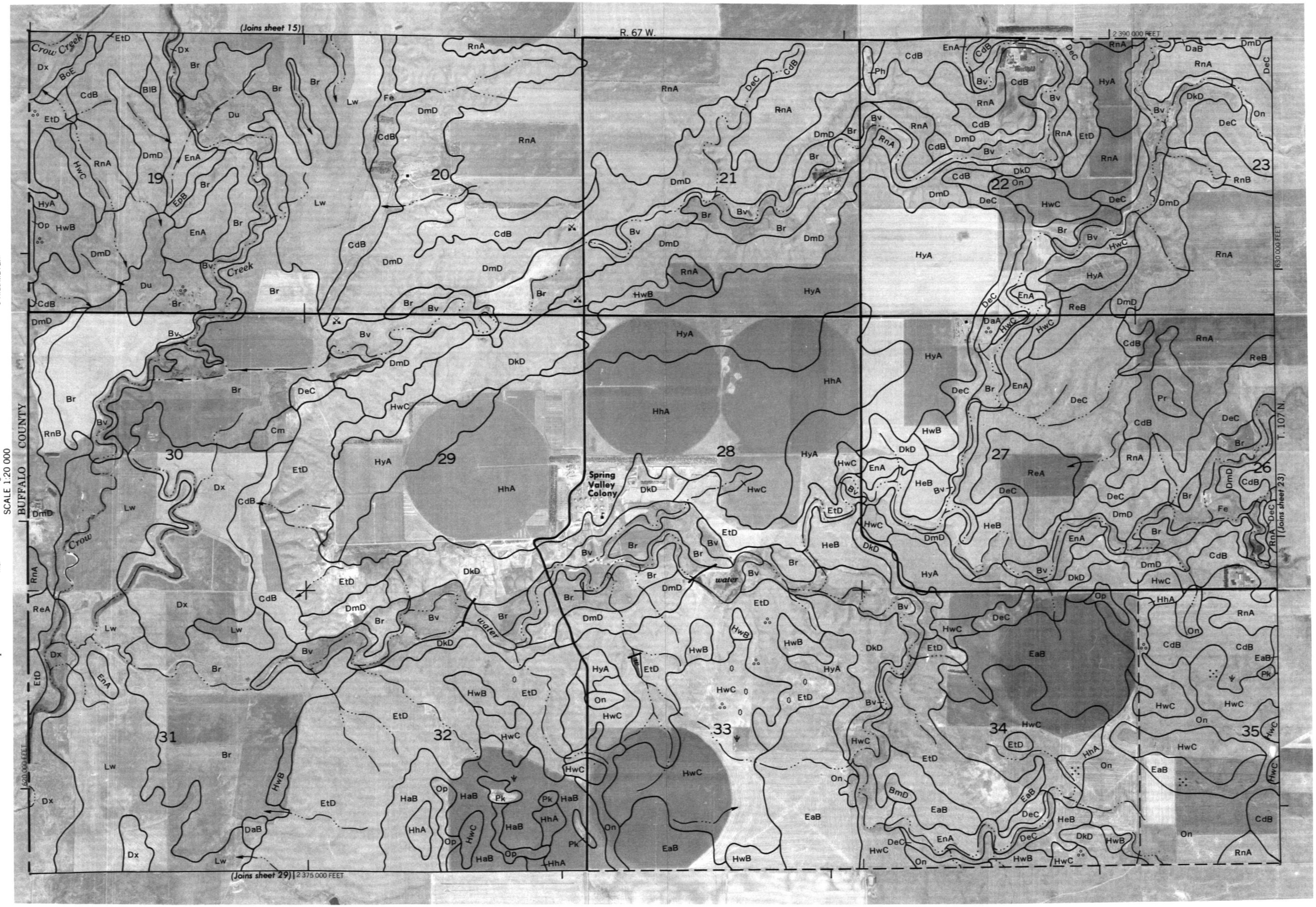


JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 21

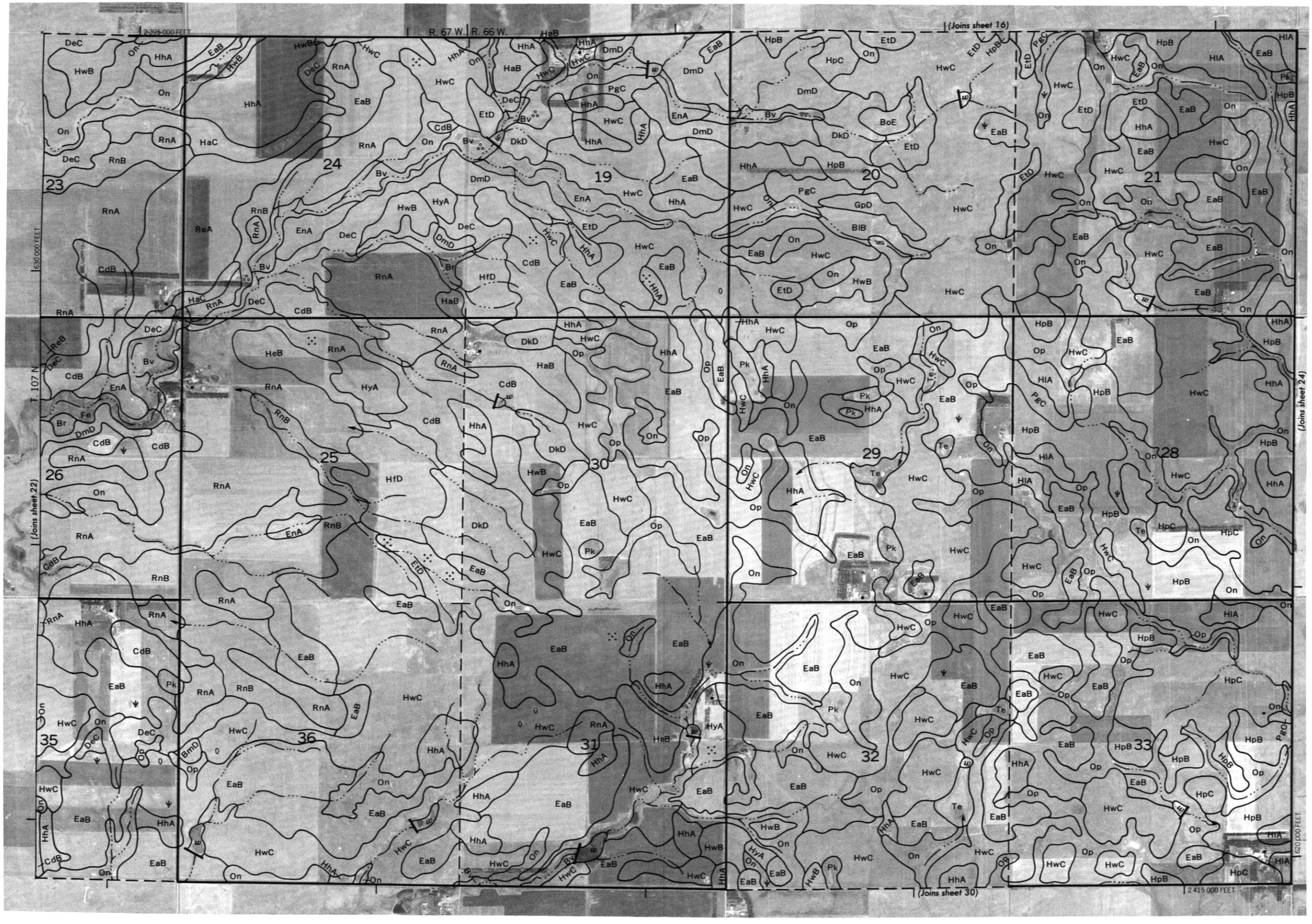
N

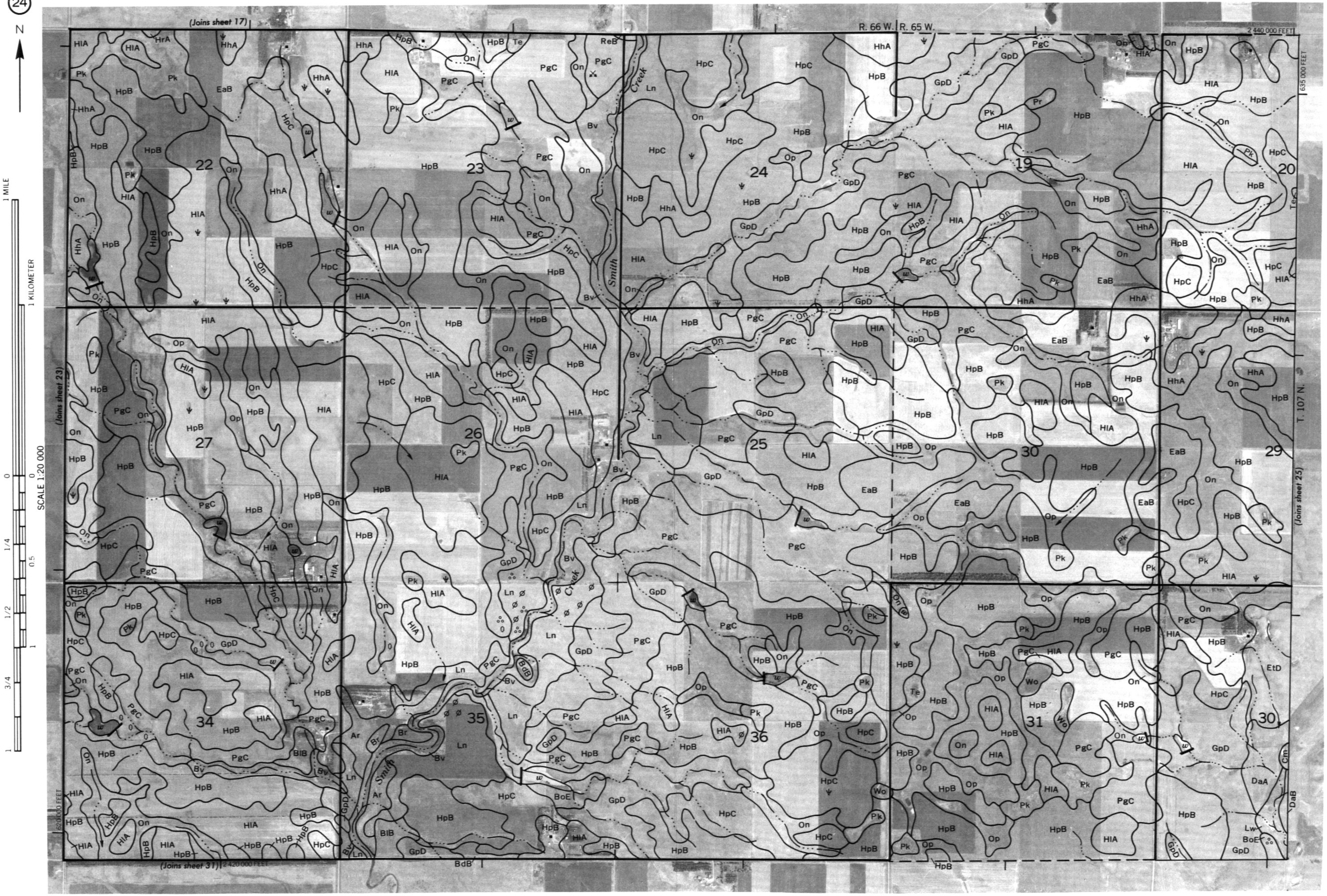
1 MILE
1 KILOMETER
SCALE 1:20 000
0 1/4 1/2 3/4 1
0 0.5 1



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 23





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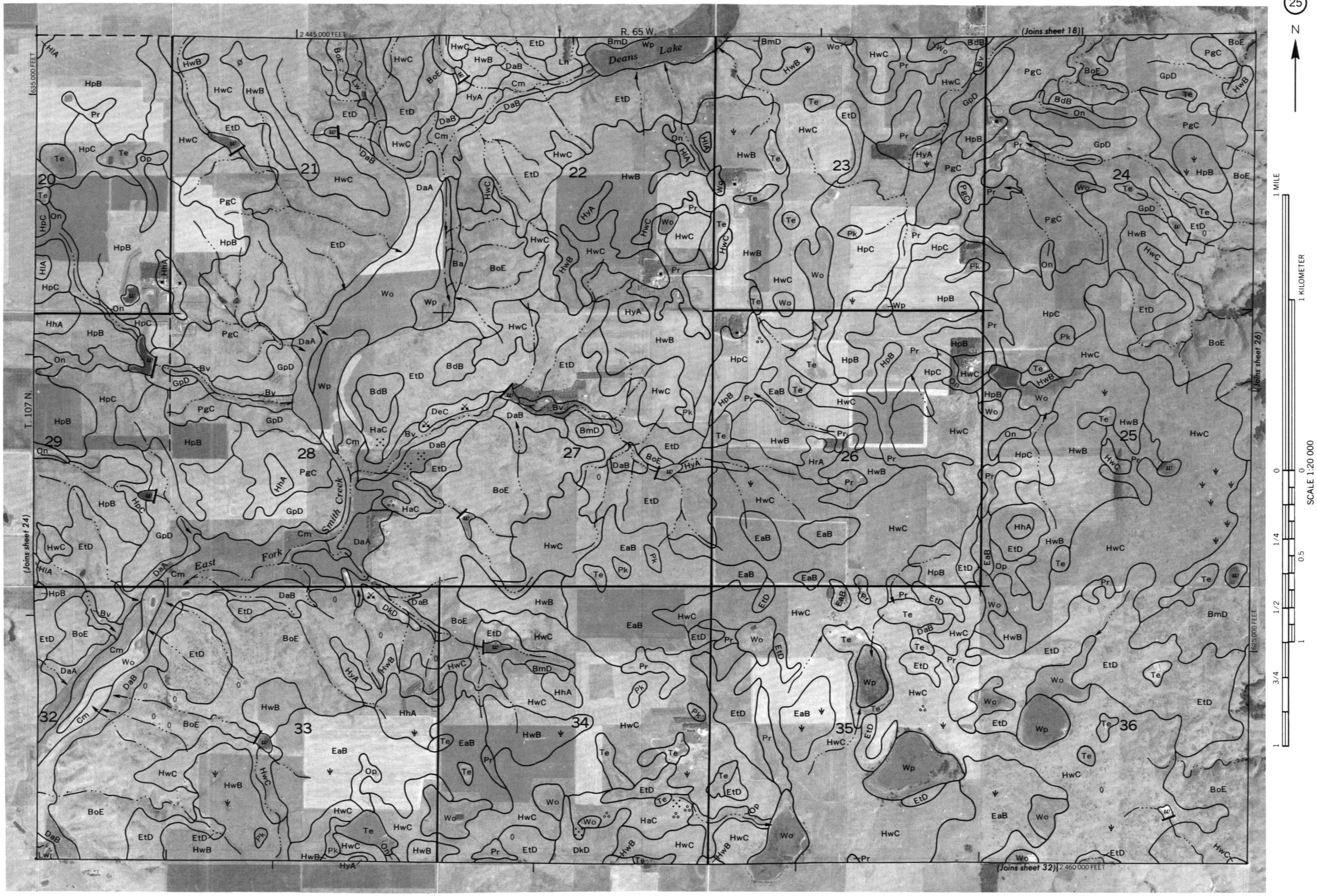
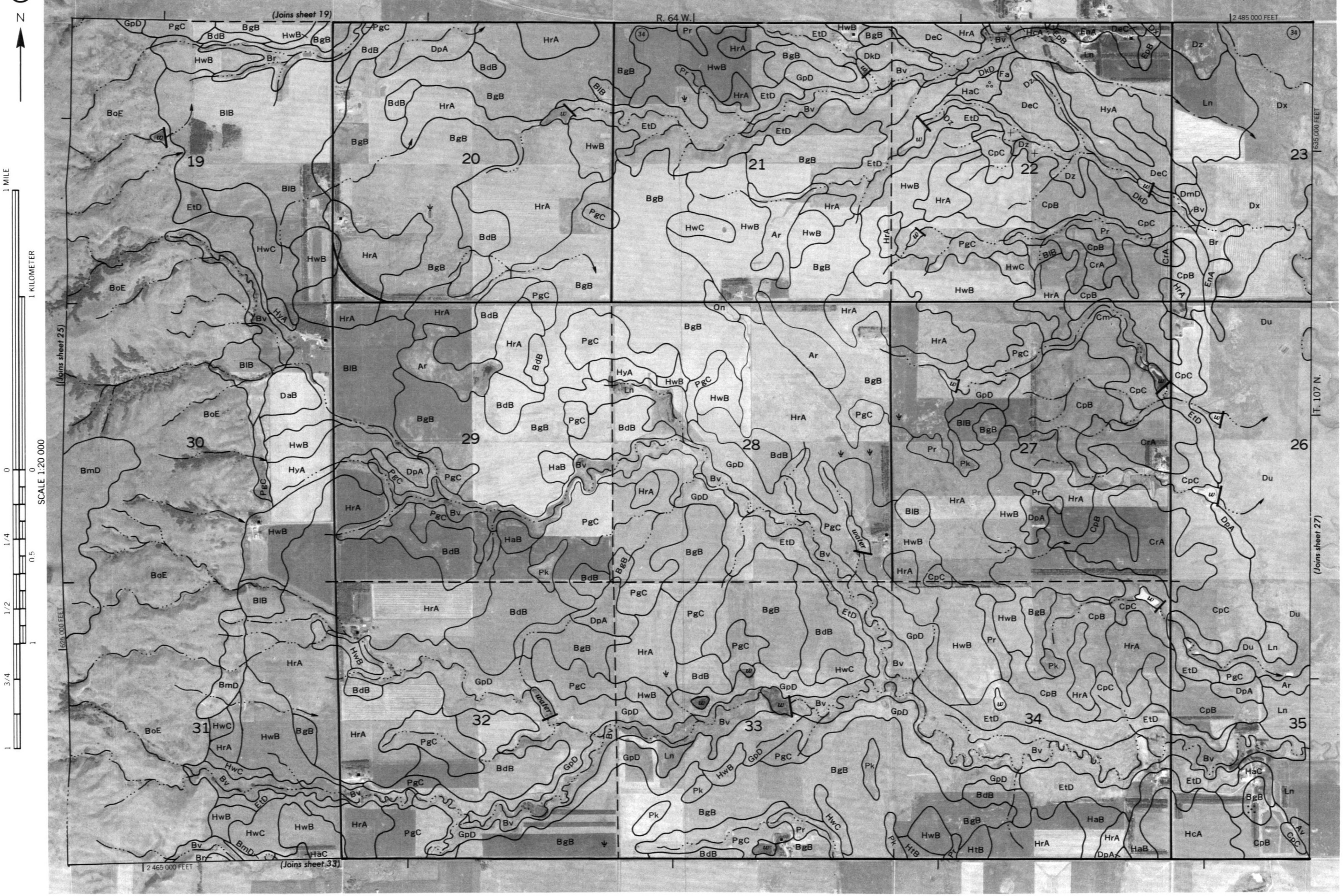
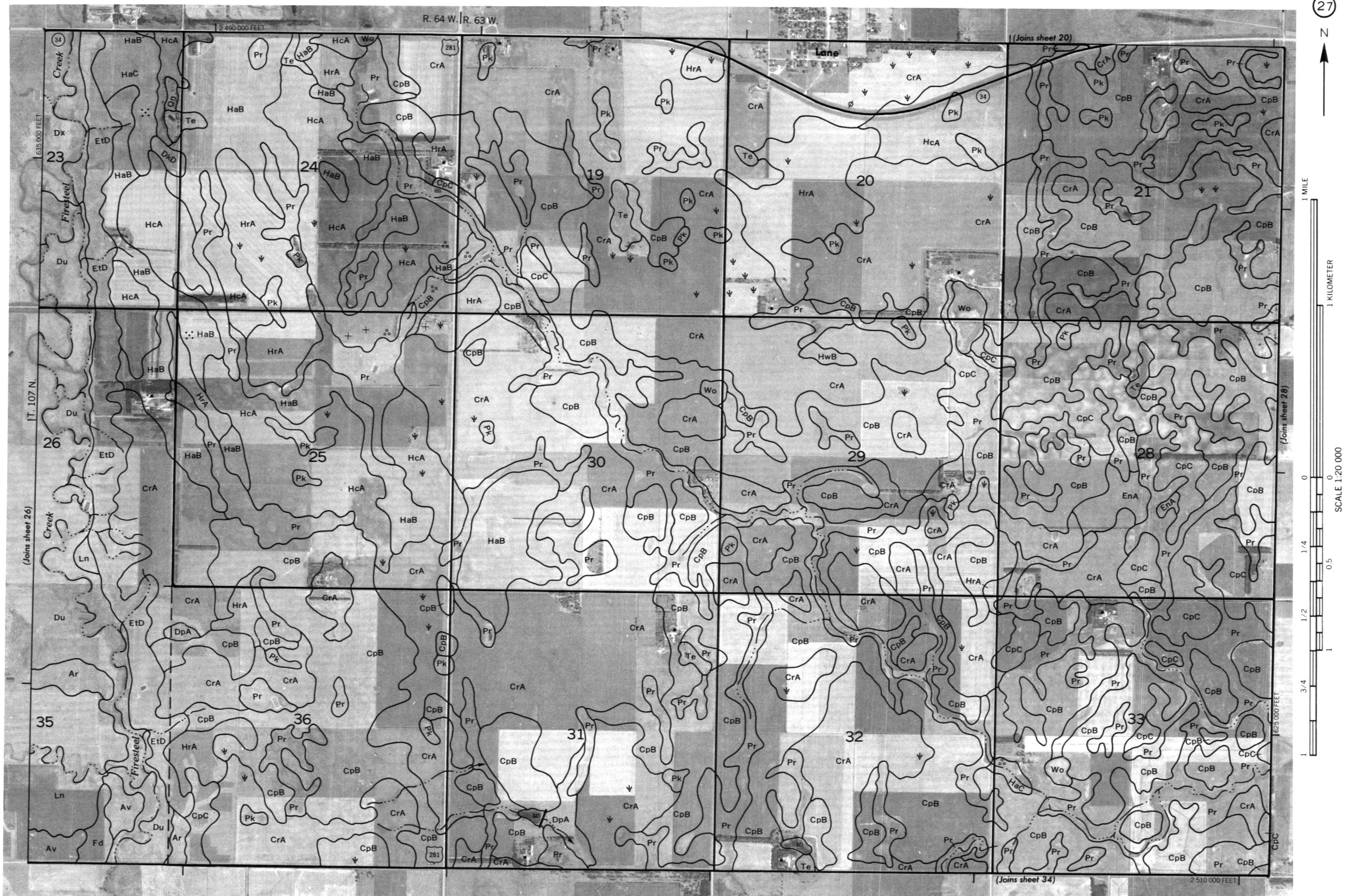


JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 26



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 27



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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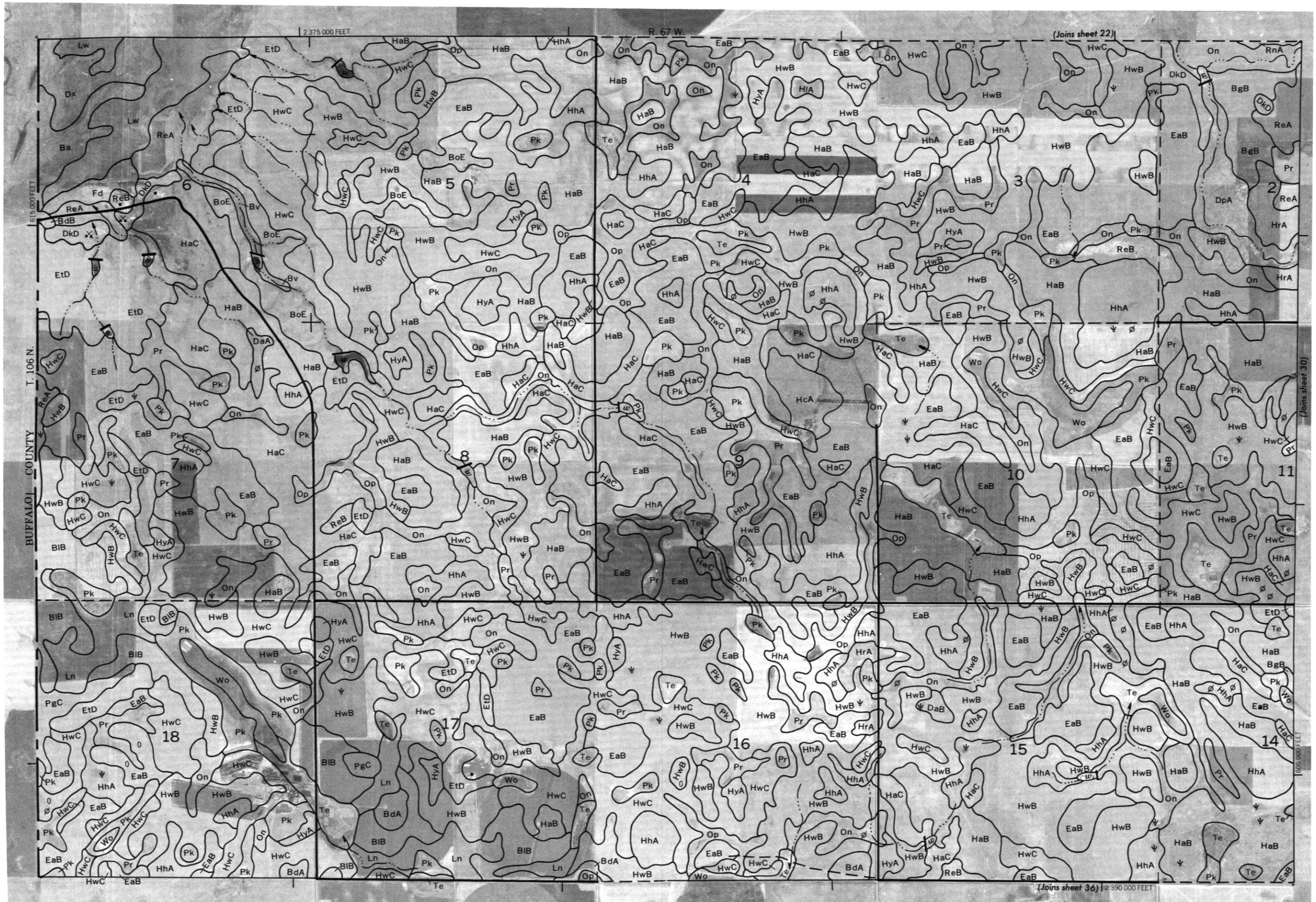

30

N

R. 67 W. | R. 66 W.

(Joins sheet 23)

2 415 000 FEET

615 000 FEET

T. 106 N.

(Joins sheet 29)

(Joins sheet 31)

(Joins sheet 37)

2 395 000 FEET

605 000 FEET

1 MILE

1 KILOMETER

SCALE 1:20 000

0 1/4 1/2 3/4 1

0 .5 1

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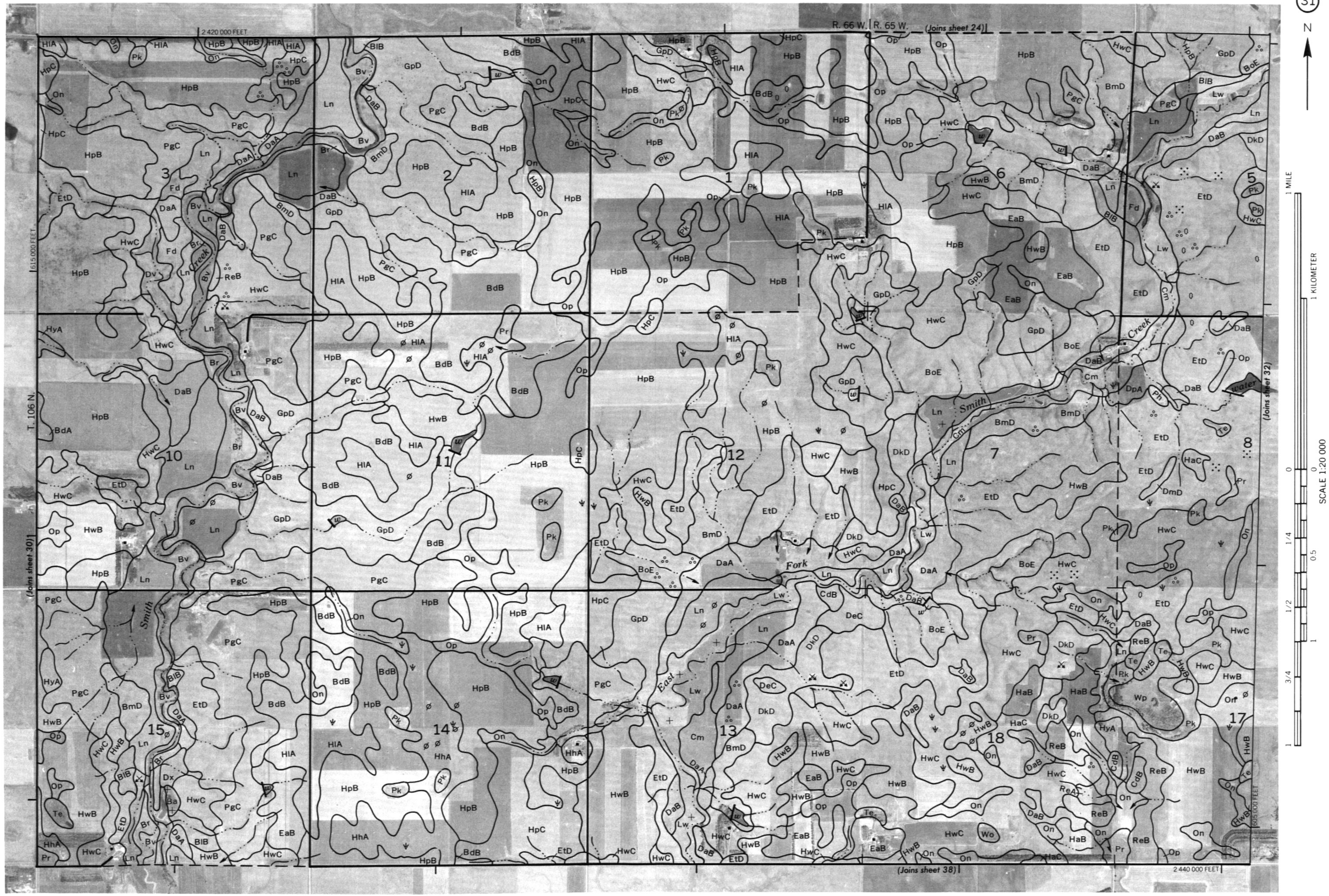
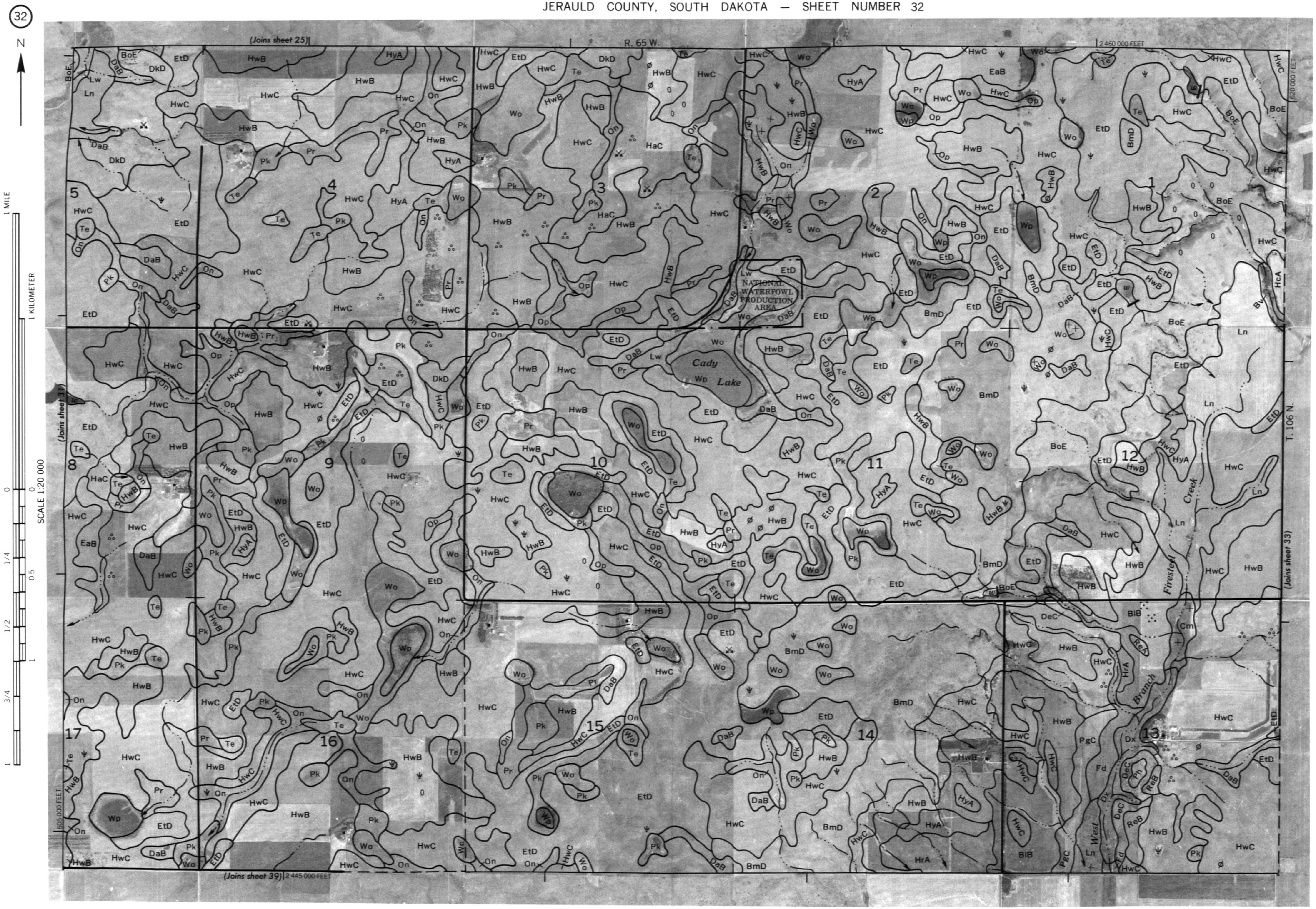
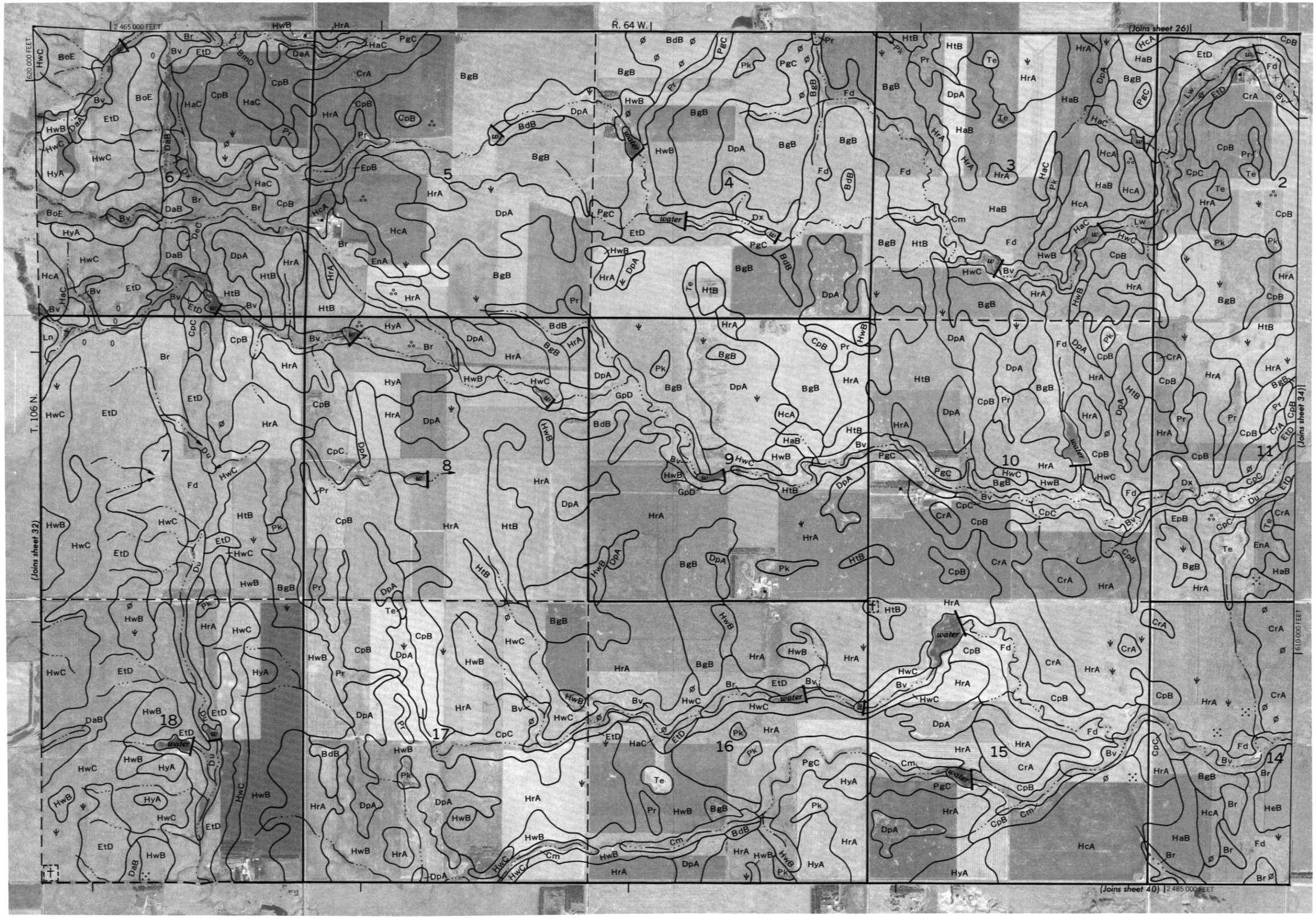


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 33



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N

R. 64 W. | R. 63 W.

(Joins sheet 27)

2 510 000 FEET

620 000 FEET

T. 106 N.

(Joins sheet 33)

(Joins sheet 35)

(Joins sheet 41)

2 490 000 FEET

610 000 FEET

Firesteel Creek

1 MILE

1 KILOMETER

SCALE 1:20 000

0 0.5 1

1/4 1/2 3/4 1

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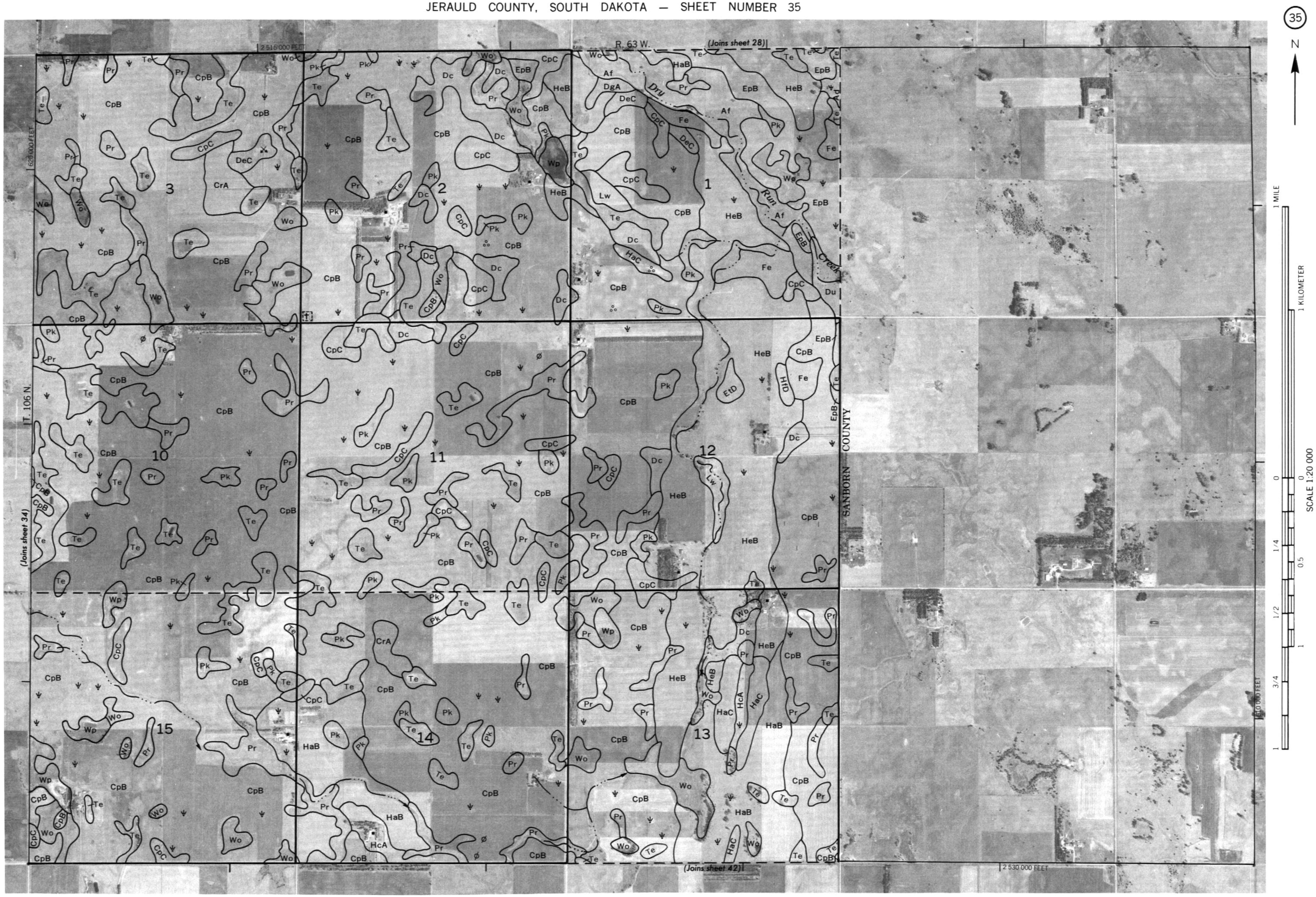

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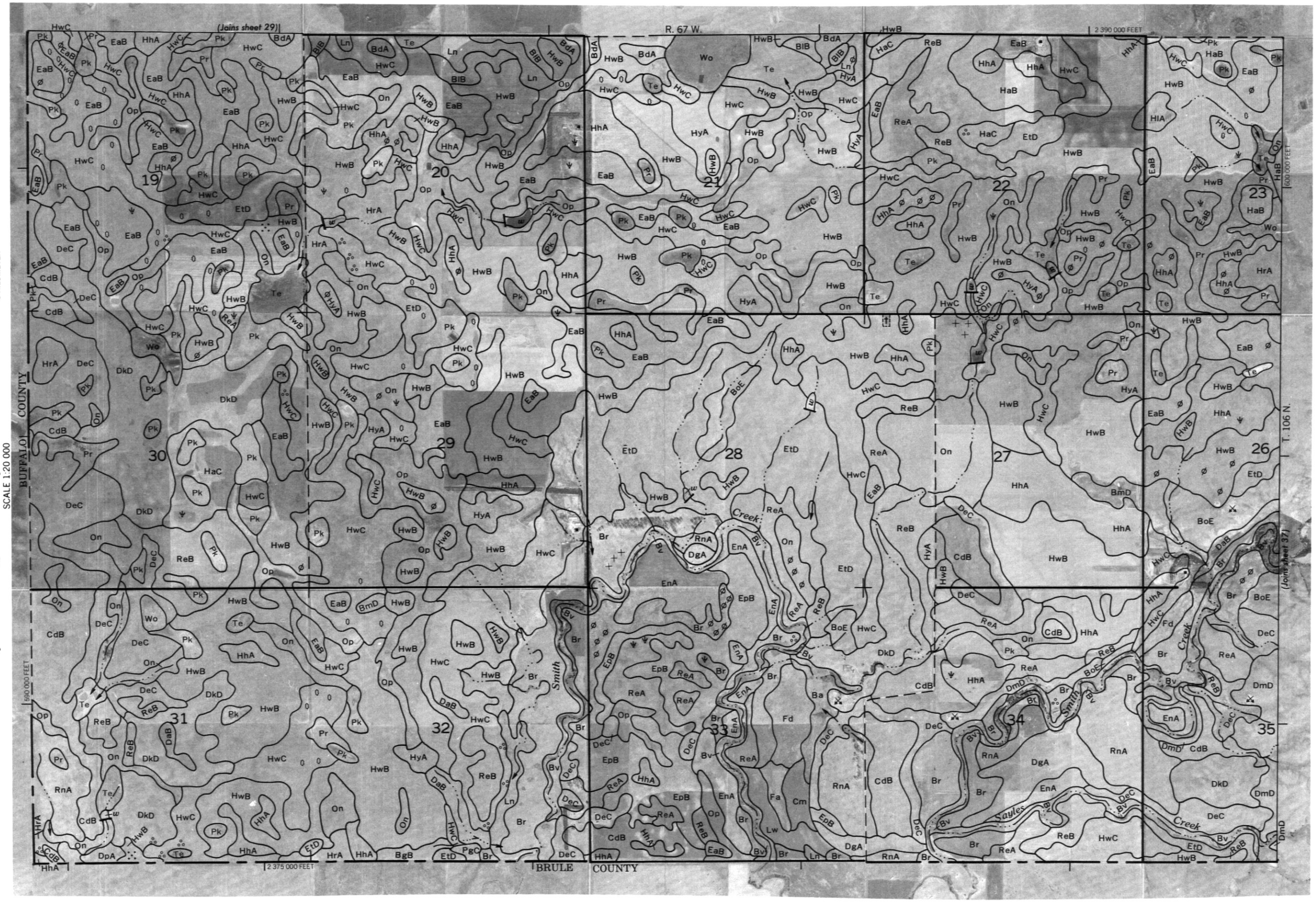

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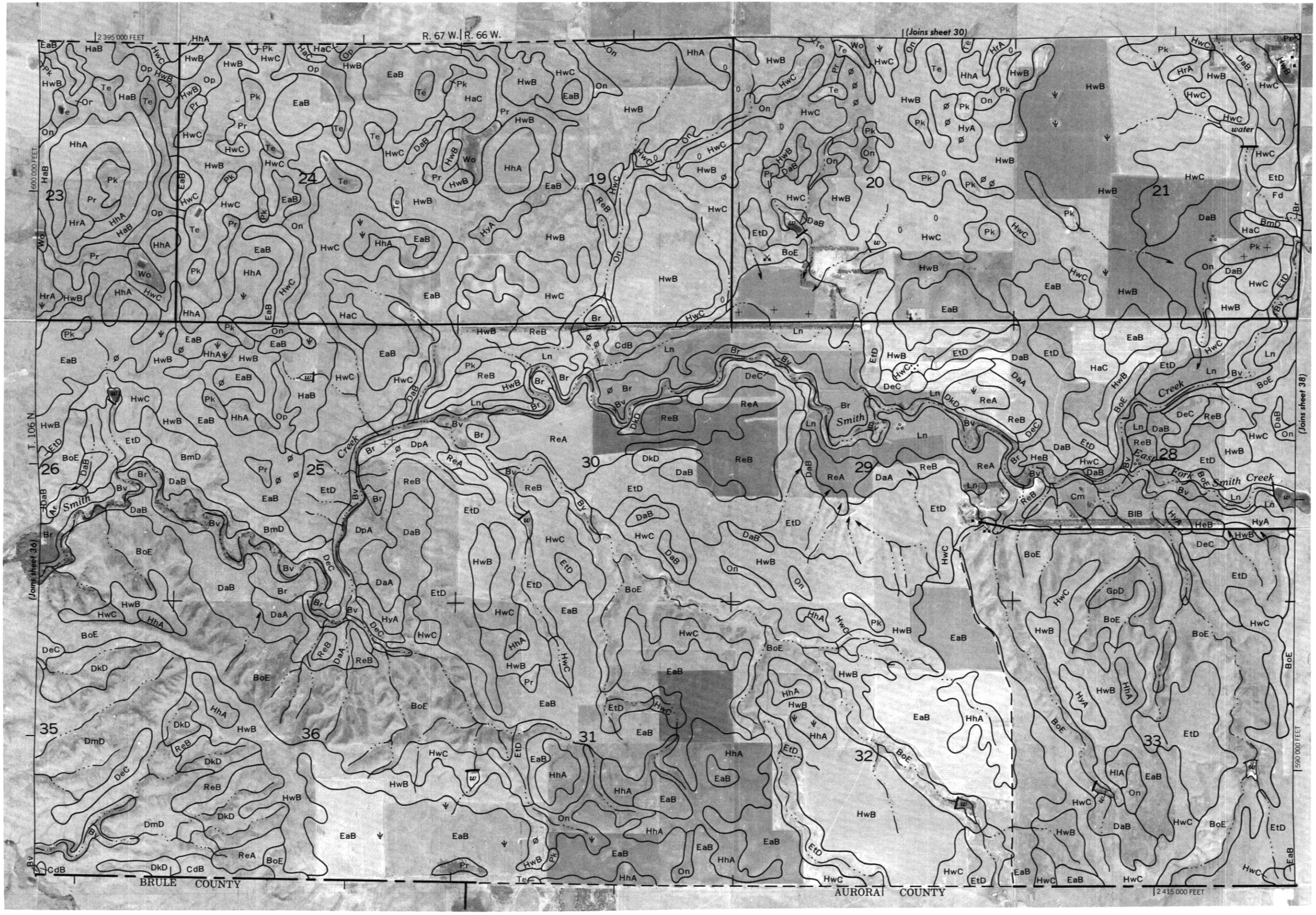

N

1 MILE

1 KILOMETER

SCALE 1:20 000

(Joins sheet 31)

R. 66 W. | R. 65 W.

2 440 000 FEET

600 000 FEET

T. 106 N.

(Joins sheet 37)

(Joins sheet 39)

Crow Lake

Horse-Shoe Lake

Smith Creek

East Fork Smith Creek

2 420 000 FEET

590 000 FEET

AURORA COUNTY

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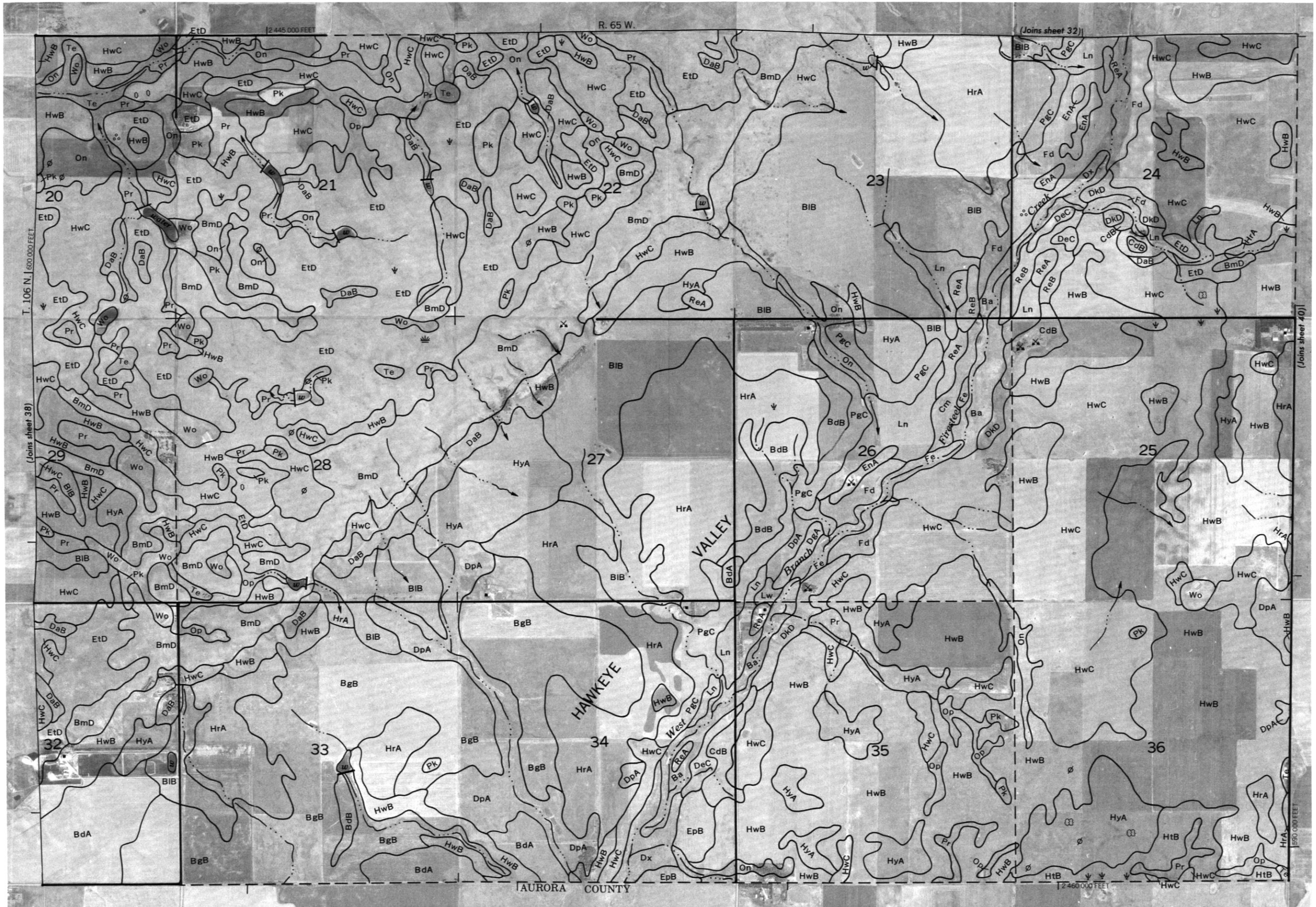
JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 39



39

N

1 MILE

1 KILOMETER

SCALE 1:20 000

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JERAULD COUNTY, SOUTH DAKOTA — SHEET NUMBER 40

40

N

(Joins sheet 33)

R. 64 W.

2 485 000 FEET

605 000 FEET

T. 106 N.

(Joins sheet 39)

(Joins sheet 41)

1 MILE

1 KILOMETER

SCALE 1:20 000

590 000 FEET

2 465 000 FEET

AURORA COUNTY

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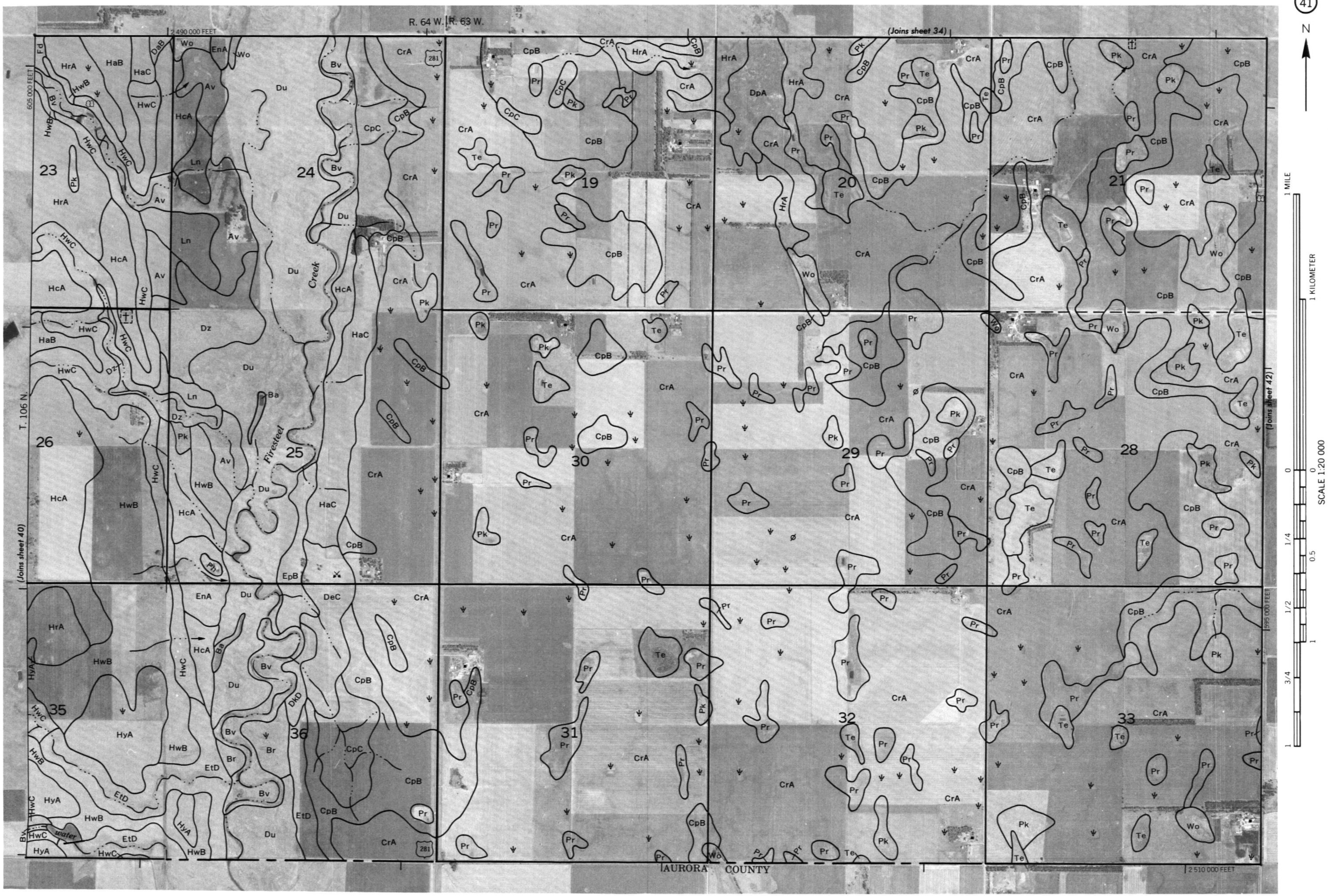

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